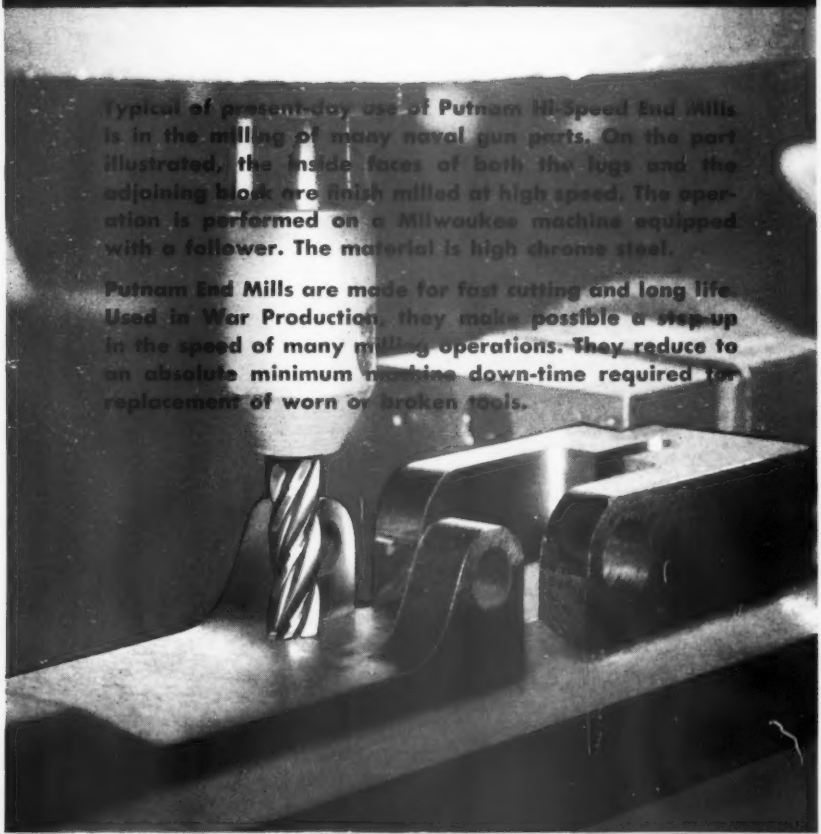
The TOOL & DIE Journal
Tool-Die-Machine PROGRESS

END MILLS THAT ARE HELPING To *Speed War Production*



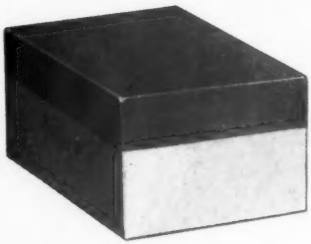
Typical of present-day use of Putnam Hi-Speed End Mills is in the milling of many naval gun parts. On the part illustrated, the inside faces of both the lugs and the adjoining block are finish milled at high speed. The operation is performed on a Milwaukee machine equipped with a follower. The material is high chrome steel.

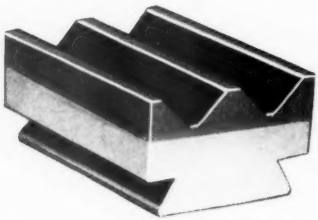
Putnam End Mills are made for fast cutting and long life. Used in War Production, they make possible a step-up in the speed of many milling operations. They reduce to an absolute minimum machine down-time required for replacement of worn or broken tools.

PUTNAM TOOL COMPANY

2985 Charlevoix Avenue • Detroit, Michigan

NEW WAY TO CONSERVE HIGH SPEED STEEL





Dovetail forming cutters made from FCC Electrically Welded Composite Steel Blanks *(high speed steel cutting face; mild steel base)* **save at least 50% of high speed steel. Besides, they offer other distinct advantages. Obvious among them are:—**

1. **Non-hardenable, tough base minimizes tendency to crack and break out at sharp dovetail corners and screw holes during heat treating or when working.**

2. **Easier to drill and tap screw holes and machine dovetails in mild steel base; this work may be done *after* hardening if desired.**

3. **More prompt delivery because of reduced amount of high speed steel.**

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5. ***Marked saving of strategically important tungsten.***

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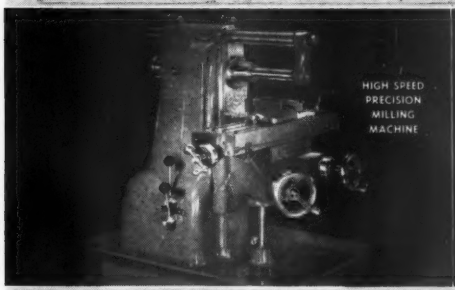

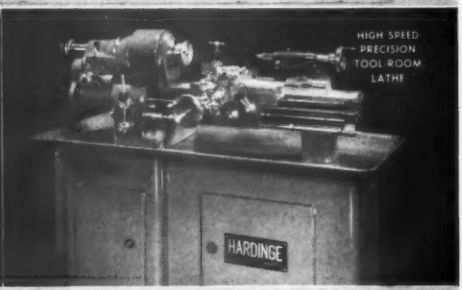

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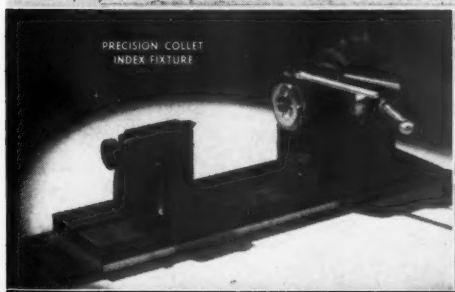

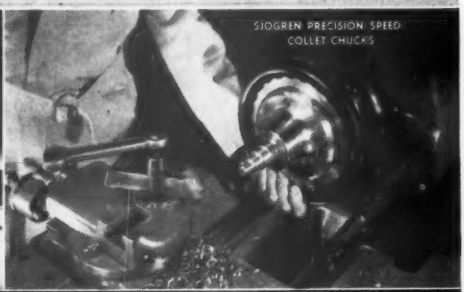

HARDINGE BROTHERS, Inc., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

The TOOL & DIE Journal

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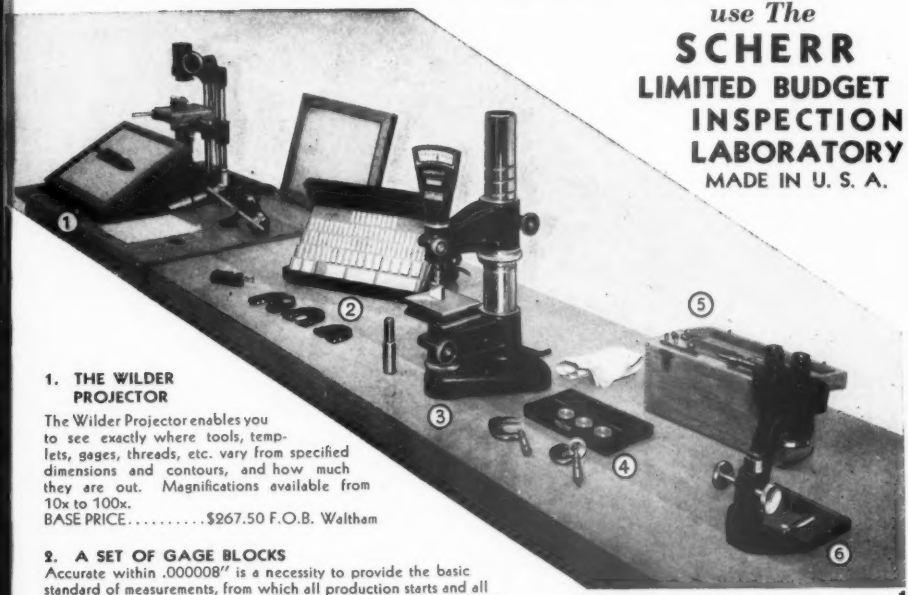

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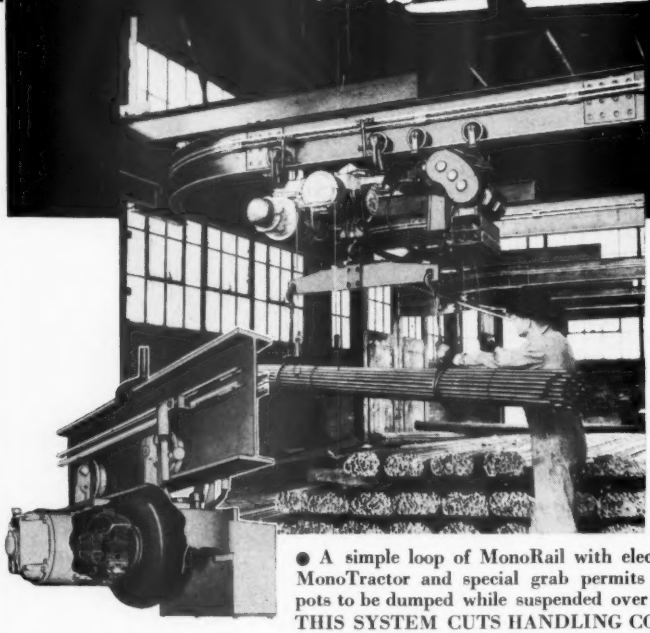

● A simple loop of MonoRail with electric hoist, MonoTractor and special grab permits annealing pots to be dumped while suspended over shakeout. THIS SYSTEM CUTS HANDLING COSTS 64%

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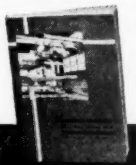

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Here's Why!
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Analysis
C .75 — .85
Cr 3.50 — 4.50
W 5.00 — 6.00
Mo 4.00 — 5.00
V 1.25 — 1.75

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PITTSBURGH, PA.
Tool Steel Division
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Send me a copy of the "DBL Blue Data Sheet."
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COMPANY _____
ADDRESS _____

1/39 the thickness of a dollar bill

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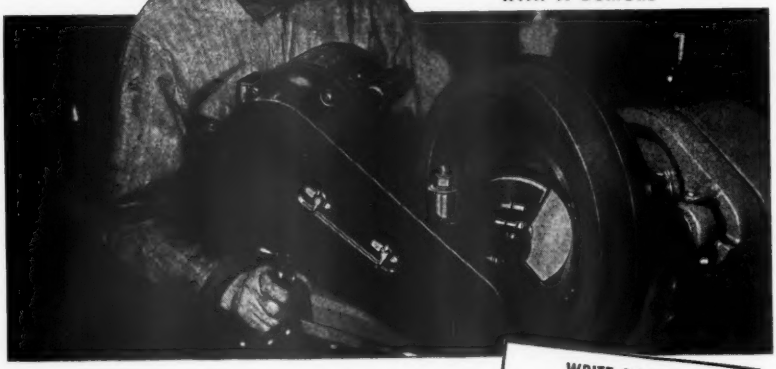
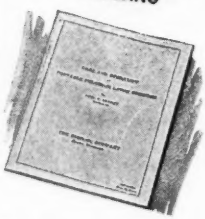


WRITE FOR THIS HELPFUL INSTRUCTION BOOK ON PRECISION GRINDING



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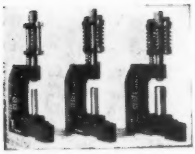

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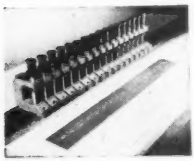
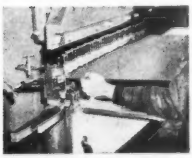


Any size or shape holes can be punched with Wales Units.



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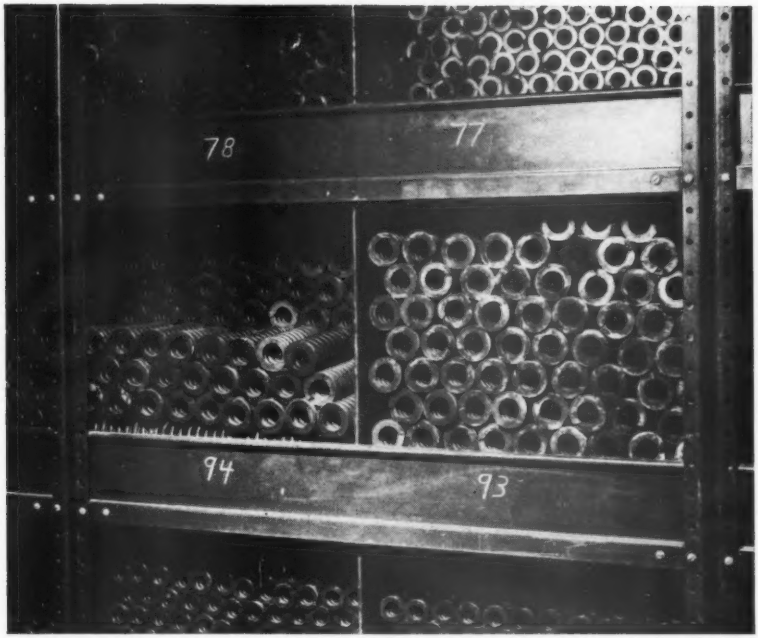

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- Operation Saving
- Material Saving
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- Flatness
- Close Limits

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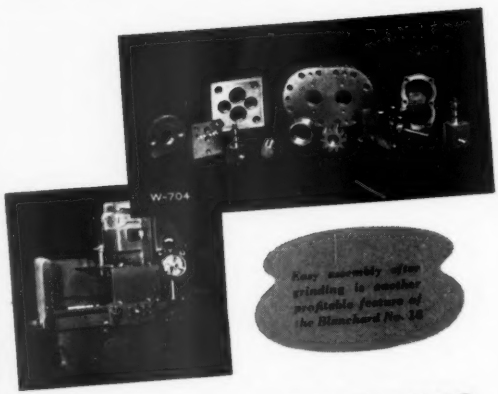

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The speed with which parts can be assembled is a direct reflection of machining operations. All the flat surfaces on the pump parts, shown above, were ground on a Blanchard No. 18 Surface Grinder. This manufacturer is keeping his assembly cost low because the surfaces are flat and parallel and the finish is excellent. The accuracy needed for tight joints and correct alignment is maintained without sacrificing production.

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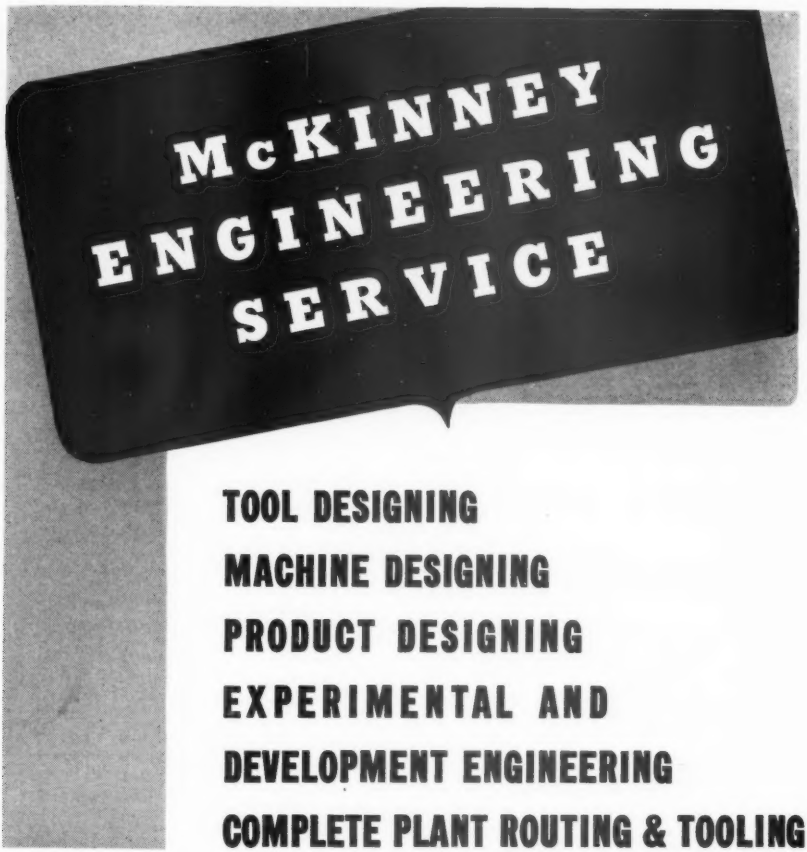

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MASONITE CORPORATION

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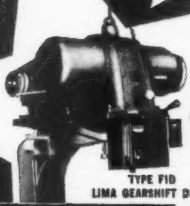
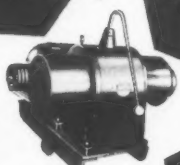
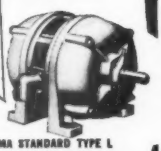


TYPE F1D
LIMA GEARSHIFT DRIVE



TYPE F2D
LIMA GEARSHIFT DRIVE



LIMA STANDARD TYPE L
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LIMA MAGNETIC
POLISHING LATHE

Lima Electric Motors, Lima Gearshift Drives and Lima Magnetic Polishing Lathes, have proven themselves on the War Production Front.

In addition to simplicity of design and ease of installation, Lima's are engineered to meet the War Production Board's constantly increasing demands on production machines in your plant. Lima engineers, aware of today's vital speed requirements, are at your service—consult them on any questions of motorizing your production equipment. Proven engineering recommendations are at your disposal . . . Keep War Production up with LIMA ELECTRIC MOTORS — LIMA GEARSHIFT DRIVES — LIMA MAGNETIC POLISHING LATHES.

PROMPT DELIVERIES

LIMA ELECTRIC MOTORS - SIZES ¼ to 75 H.P.
FOUR TYPES OF LIMA GEARSHIFT DRIVES
TYPE F1 DIRECT DRIVEN UNITS 1 to 5 H.P.
TYPE F2 DIRECT DRIVEN UNITS 7½ to 25 H.P.
TYPE F1D BELT DRIVEN UNITS 1 to 5 H.P.
TYPE F2D BELT DRIVEN UNITS 7½ to 25 H.P.
LIMA MAGNETIC POLISHING LATHES

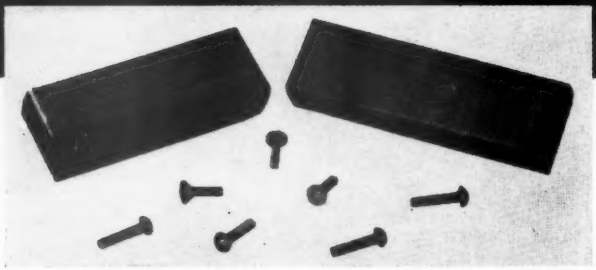
THE LIMA ELECTRIC MOTOR CO.

LIMA, O. *OFFICES: NEW YORK · CHICAGO · DETROIT* U. S. A.

LIMA ELECTRIC MOTORS · LIMA MAGNETIC POLISHING LATHES · LIMA GEARSHIFT DRIVES

Top Notch FOR TOUGH JOBS

Jessop TOP-NOTCH Shock-Resisting Tool Steel



Thread rolling die made from Jessop TOP NOTCH, threaded over 2,000,000 screws made of S.A.E. 1010 steel.

Die operations, under conditions of constant and severe impact, are more efficient and more economical when dies are made from Jessop Top Notch Shock-Resisting Tool Steel.

Jessop Top Notch is a low chrome, low tungsten alloy steel whose analysis combines characteristics of good wear resistance and extreme toughness. These qualities make Jessop Top Notch adaptable for use in many cold work and semi-hot work applications where resistance to shock is an important factor. It may be either oil hardened or air hardened. Technical data furnished on request—write for free literature.

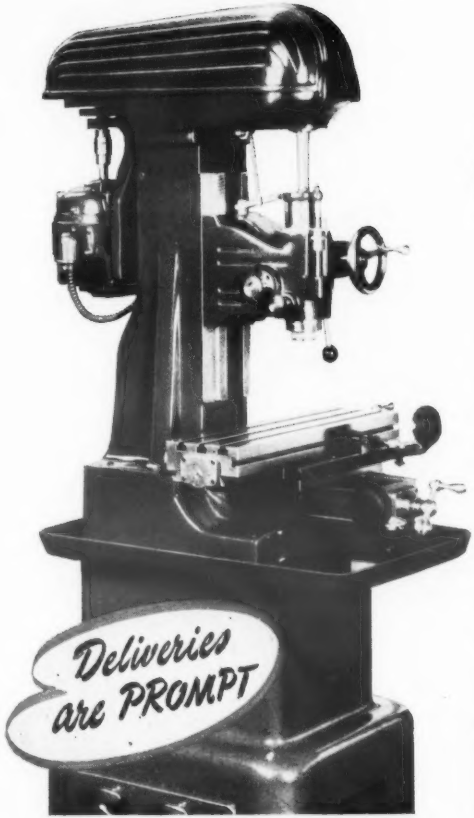
There is a Jessop steel for every tool and die requirement.

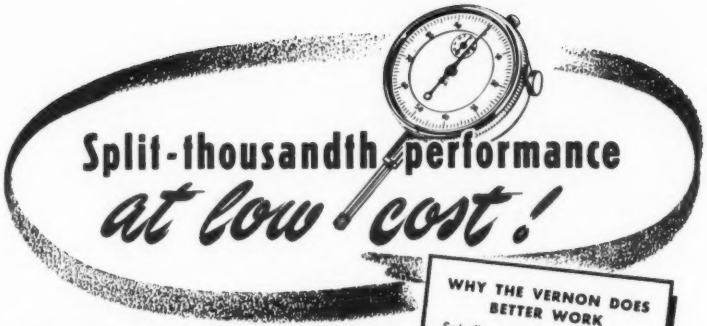
JESSOP STEEL COMPANY
WASHINGTON, PENNA., U. S. A.

JESSOP STEEL CO · MADE IN AMERICA · FINE JESSOP STEELS · WASHINGTON, PA.

JESSOP STEELS FOR AMERICA AND HER ALLIES

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE STEELS





Close manufacturing tolerances assure every user of the Vernon Vertical Mill and Jig Borer extreme accuracy on all precise jig boring, layout or vertical milling operations. And what's more, the Vernon is designed to *maintain* those tolerances over a long period of useful life through careful engineering, selected materials and skillful construction—yet the Vernon is in the low-priced group! Write now for folder.

VERNON ROTARY TABLE—Only 7" table on the market. Heavily ribbed, precision ground—overall height 2¾".

WHY THE VERNON DOES BETTER WORK

Spindle rigidly mounted in ultra-precision pre-loaded ball bearings.

Collet end carburized, hardened and ground.

Quill is hardened and ground to exact fit with precision honed head bore.

Tapered gibs on all sliding dovetailed surfaces.

Large bearing surfaces hand scraped and accurately fitted.

Dial indicators and measuring rods for extreme accuracy.*

Close-grained castings normalized before machining.

Large variety of accessory equipment . . . available as standard extras.

*Standard extra

MACHINERY MANUFACTURING COMPANY
1915 EAST 51 ST., VERNON · LOS ANGELES, CALIFORNIA
Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS and JIG BORERS, SHAPERS and GRINDERS

TO PLANT SUPTS.

This is one of a series of ads addressed primarily to new grinder hands. If you would like additional copies without our signature, for your bulletin board, tell us how many you need.

How to get better and longer service from your grinding wheels...

● The war imposes a double task on industry and a patriotic responsibility on grinder hands. Speed of production has to be increased, without waste of basic materials. With grinding playing such an important part in production, these simple rules may help you do your job better.

1 USE THE RIGHT WHEEL IN THE RIGHT PLACE

Given data on the type of grinding job, the character of metal to be ground, the amount of stock to be removed and the finish desired, a grinding wheel manufacturer can give you a wheel in the right grit, grade, grain, bond, shape and size to meet definitely your grinding conditions—a wheel that will last longer, do better work at reduced grinding costs. And sales engineering service will help you to select the right wheel for every job.

2 MAKE SURE YOUR GRINDING SET-UP IS RIGHT ON EVERY JOB

Manufacturer's recommendations should be carefully followed on wheel speed, work speed, proper coolant, wheel traverse, rate of infeed etc. Only the correct balance of these factors gives you the full advantage of properly specified wheels. One of the services performed by grinding wheel sales engineers is to check your grinding conditions on the job and point out the best method of carrying out the grinding operation.

THE CARBORUNDUM COMPANY ● NIAGARA FALLS, N. Y.

(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

★ CHIP BREAKER *and* CARBIDE TOOL GRINDERS

Maintaining highest efficiency in YOUR cutting tools to prolong tool-life and insure constant high production rates means one thing: Grind 'em frequently, KEEP 'EM SHARP!

Here is YOUR answer to that problem.

MODEL 4 COMBINATION CHIP BREAKER AND CARBIDE TOOL GRINDER

Hammond offers YOU 20 different types in its wide line of Carbide Tool Grinders for rough and finish grinding, and the grinding of chip breaker grooves into Carbide Tools. Each type is modern—with up-to-the-minute features.

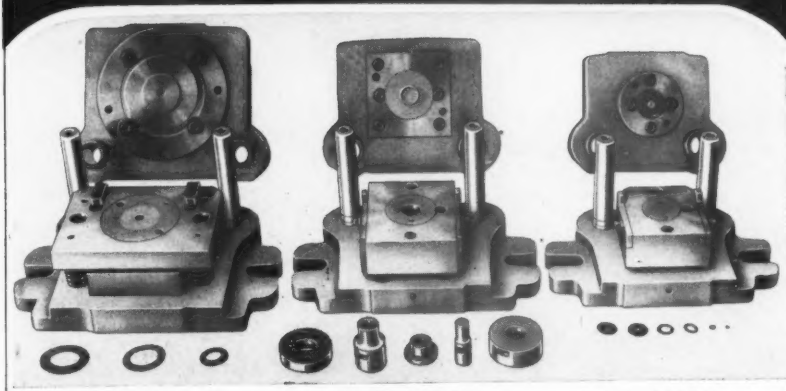
Act now—write for complete information. Hammond Grinders will help you maintain that high efficiency so necessary in the speeding-up of YOUR Arms Production.

"Beat that Delivery Promise" with Hammond Grinders and sharper tools. ASK FOR BULLETIN GP-14.

Hammond Machinery Builders INC.
1631 DOUGLAS AVENUE • KALAMAZOO • MICHIGAN
EASTERN BRANCH—71 WEST 23RD STREET, NEW YORK CITY

FOR SHORT OR LONG RUNS
Boring, Turning, Facing, Grooving, Chamfering
• • • with Precision!
Tomorrow, just as today, the watchword of industry in this country will be "Production." With the lid lifted high on accumulated peace time needs, the advantage will then definitely be with those who today are installing equipment for war production with thought for the future. The Ex-Cell-O Precision Boring Machine—for boring, turning, facing, grooving, chamfering to "tenth" accuracy—is the preferred type and make of equipment among many manufacturers producing parts for war purposes in large quantities today; its extreme flexibility in application makes it an equally sound investment for the inevitable tomorrow, in shops either small or large.
EX-CELL-O CORPORATION • DETROIT
EX-CELL-O Precision MACHINES AND TOOLS
XLO
EX-CELL-O MACHINE PRECISION
FOR HIGH PRODUCTION

The Story of HOVIS
UNIVERSAL WASHER DIES



Capacity 2½" Dia. Capacity 1½" Dia. Capacity ¾" Dia.

ELEVEN MORE HOVIS WASHER DIES WENT INTO PRODUCTION IN DEFENSE PLANTS LAST MONTH

MORE THAN 200 NEW AND DIFFERENT WASHERS ARE BEING MADE ON THESE DIES.

FIVE SIMPLE, INTERCHANGEABLE PARTS ARE ALL THE SPECIAL TOOLING REQUIRED TO MAKE A NEW SIZE OF WASHER.

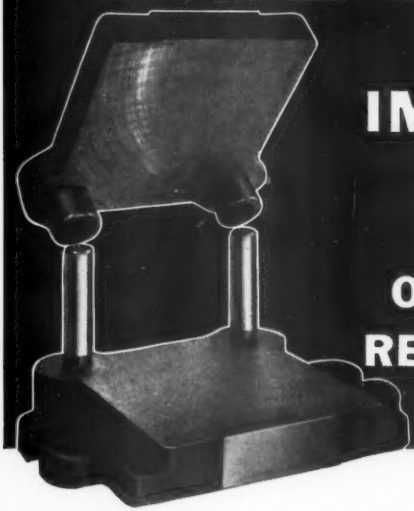
THE VARIOUS INTERCHANGEABLE PARTS CAN BE REMOVED AND REPLACED BY THE USE OF STANDARD HEXAGON SOCKET SCREW WRENCHES WITHOUT DISMANTLING THE DIE IN ANY WAY, THE CHANGE BEING A MATTER OF MINUTES. ALL OF THESE PARTS ARE HELD IN BY THE HOVIS PUNCH RETAINING MECHANISM.

HOVIS SCREWLOCK COMPANY

8100 E. Nine Mile Road - Van Dyke, Michigan

Suburb of Detroit *Phone: Centerline 1575*

The Interchangeability of DANLY DIE SETS IS IMPORTANT TO YOU In the OCCASIONAL REPLACEMENT OF A PART



It Is Far More Important As a Continuous Guarantee of Accuracy in Die Making and Daily Production of Stampings

WRITE OR CALL YOUR DANLY BRANCH

DANLY MACHINE SPECIALTIES, INC.
2100 So. 52nd Ave., Chicago, Ill.

513 East Buffalo Street, Milwaukee, Wis.
47-28 37th Street, Long Island City, N. Y.
990 E. Monument Avenue, Dayton, Ohio
1549 Temple Avenue, Detroit, Michigan
16 Commercial Street Rochester, N. Y.
1745 Rockwell Avenue, Cleveland, Ohio
3913 North Broad Street, Philadelphia, Penna.
Ducommun Metals & Supply Company, Los Angeles, California; San Francisco, California

DANLY DIE SETS and DIE MAKERS' SUPPLIES

A FEW GORTON CIRCULAR TABLES ARE AVAILABLE FOR IMMEDIATE DELIVERY Precision built, for a lifetime of service. Simple, positive adjustments compensate for wear. Table surfaces are accurate within .0005". Work may be indexed to 5 minutes or less. Standard sizes: 10", 12", 15" diameter. For full details write for FREE Accessories Catalog 1317-D.

PRODUCING TOUGH ALLOY STEEL DIES within maintained limits of ±.001" or closer makes possible a saving of hours of hand finishing. This job and many others like it being turned out by a midwest die and mold manufacturer is a typical example of what can be accomplished with the combination of a Gorton Super-Speed Mill and a Gorton Circular Table, accurate within .0005".

Photo above shows how the die is simply mounted on the circular table. Large micrometer dials on the Gorton Miller and the sensitive "feel" of the machine permit the operator to hold close tolerances with hand feed. Utilizing the Gorton wide range of spindle speeds, these dies are completely machined in 30 hours. Precision milling in this manner produces a finish so smooth that hand finishing is reduced to a minimum.

Gorton Engineers, specializing in Vertical High-Speed Milling, will be glad to make recommendations on your work—without obligation.

HOW TO REPRODUCE ORIGINAL DIES *without Skilled Help*

NOTE—To owners of Gorton Super-Speed Vertical Milling Machines built since 1935—if you have MULTIPLE DIES to REPRODUCE from an original, order a GORTON Duplicating Tracer Head and Duplicating Table to quickly convert your Miller into a double-purpose machine, capable of Duplicating parts and sinking dies, as well as Milling.

This equipment will effect an average time-saving of 50 per cent with *an unskilled man or woman* operator.

SUPER-SPEED MILLING DATA

MACHINE—Gorton Super-Speed Vertical Mill.

PART—Alloy Steel Die.

CUTTERS—Gorton Single and Double Flute Cutters.

DIMENSIONS—1½" Deep to Parting Line.

HOLDING—Simple "T" Slot Clamps.

FEED—Hand.

SPEED—950 RPM.

ACCURACY—Limits held ±.001.

FLOOR-TO-FLOOR TIME—30 hours on Mill to very smooth finish.

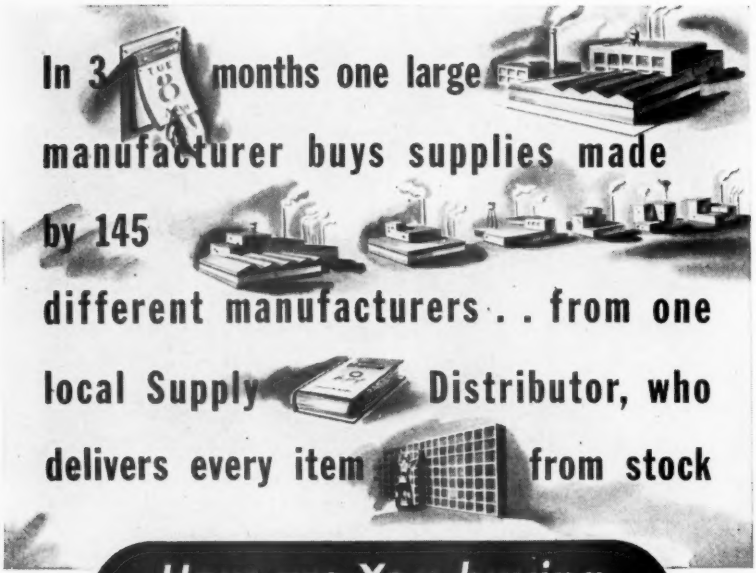
WRITE FOR CATALOG 1400-B **FREE**

giving details on Gorton Super-Speed Vertical Milling Machines.

GEORGE GORTON MACHINE CO.

1319 RACINE STREET, RACINE, WISCONSIN, U.S.A.

SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING


In 3 months one large
manufacturer buys supplies made
by 145
different manufacturers . . from one
local Supply Distributor, who
delivers every item from stock

How are You buying Your Materials?

A prominent Mill-Supply Distributor writes:—"Our big, all-time job is to help War Plants who are our customers to produce faster—by keeping them furnished with equipment and supplies on schedule.

"Just how the Manufacturer can profit by the Jobber's alert, fast-moving service in his behalf is illustrated in the experience of one of our own customers—a Manufacturer we have served for many years. We analyzed our transactions during a typical 3-month period and dug up these impressive facts:—

A—"Materials supplied by us to fill his orders during that 90-day period were produced in *145 different factories.*

B—"Goods from these 145 factories were ordered and paid for by us, and came directly to our warehouse stock.

C—"Deliveries from our warehouse to this customer were nearly always made the same day we received his order."

Depend on it—your Industrial Distributor will use every resource to supply what *you* need. He works in your interest all the time—as we know, because Mill Supply Houses have represented us in selling "Cleveland" High-Speed Twist Drills and Peerless High-Speed Reamers nationwide, for many years.

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 BEADE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
6015 SECOND BLVD. DETROIT · LONDON - E. R. BARRUS, LTD. - 35-36 ST UPPER THAMES ST. E.C.4

"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

External Threading at Lower Cost

with this "Procunier" Threading Head

There is no need to tie up expensive screw machines for external threading. With a drill press and a standard Procunier Tapping Head equipped for external threading with Acorn dies, you can efficiently handle threads from No. 2 to $\frac{1}{4}$".

Recommended especially for brass or materials not requiring lubricants. Work can be held within as close tolerances as you need. In many cases production can be considerably increased over screw machine set-ups — and the jobs can be handled as rapidly as tapping. The same head can be used for tapping by simply changing the chuck spindle.

Procunier Tapping Heads for both tapping and external threading offer many exclusive advantages that assure increased production, greater accuracy and less spoiled work. That's why they are used and approved by America's leading production shops. For the complete story

SEND FOR BULLETIN

giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs. The new Tru-Grip Tap Holder — and also the full line of Procunier Universal Tapping Machines, hand, foot or air-operated.

PROCUNIER SAFETY CHUCK CO.
12-14 S. Clinton St., Chicago, Ill.

Send me bulletins on: ☐ High Speed Tapping Heads ☐ Tru-Grip Tap Holders ☐ Universal Tapping Machines.

Name.....

Address.....

City.....State.....

PROCUNIER
SAFETY CHUCK CO.

12-14 S. CLINTON ST. CHICAGO, ILLINOIS

These Low-Cost METAL-CUTTING BAND SAWS Can Help You *Right NOW*

No. 887-C
Metal-Cutting
Band Saw

When you are confronted with an urgent need for immediate increased production in connection with the U. S. armament program — check into the possibilities of using this 14-inch Delta metal-cutting band saw. It is ideal for cutting

- Aluminum Castings
- Aluminum Sheets
- Hard Cast Brass
- Soft Cast Brass
- Brass Sheets
- Brass Tubing
- Cast Iron
- Copper
- Metallic Hose
- Cold Rolled Steel
- Carbon Tool Steel
- Bronze & Manganese
- Drill Rods
- High Speed Steel
- Monel Metal
- Nickel Steel
- Iron Sheets & Bars
- Pipe
- Malleable Iron
- Babbitt
- Bakelite & Molded Plastics
- Asbestos & Felt
- Brake Linings
- Fibre & Mica
- Slate & Transite
- Hard Rubber

Will help Speed up Production

There is no limit to the number of jobs you can find for this economical low-cost tool around the general tool and machine shop. And the few uses mentioned above scratch only the surface of the machine's adaptability. Once the machine is installed, there is no end to the number of jobs that are found for it!

Many Basic Advantages

This machine is not just another metal-cutting saw—but represents sound designing from the bottom up with many new basic features. Four metal-working speeds. Can be switched easily into high speed for soft materials. New Departure self-sealed ball bearings insure trouble-free performance for the entire life of the bearings.

OTHER DELTA LOW-COST MACHINES

Cut-Off Machine cuts speedily and to exact lengths a wide variety of materials.

A complete line of single and multiple spindle 14" and 17" drill presses in slow and high speed models.

Bench and Pedestal Grinders — the safest, most accurate and efficient grinders made.

Send for CATALOG

Send coupon below for latest Delta catalog giving full specifications and prices of Delta 14 inch Metal-Cutting Band Saw. Also prices and details on the complete line of Delta low-cost machines.

DELTA
MILWAUKEE

THE DELTA MANUFACTURING COMPANY
611-B E. Vienna Avenue, Milwaukee, Wis.

Please send me catalog of Delta Machines, giving specifications and prices on Delta Metal-Cutting Band Saws.

Name .....

Address .....

EASTERN ETCHING & MFG. CO.

ETCHED PLASTIC

★

DIALS - SCALES - PLATES

AVAILABLE IN COLORED AND FLUORESCENT FINISHES.

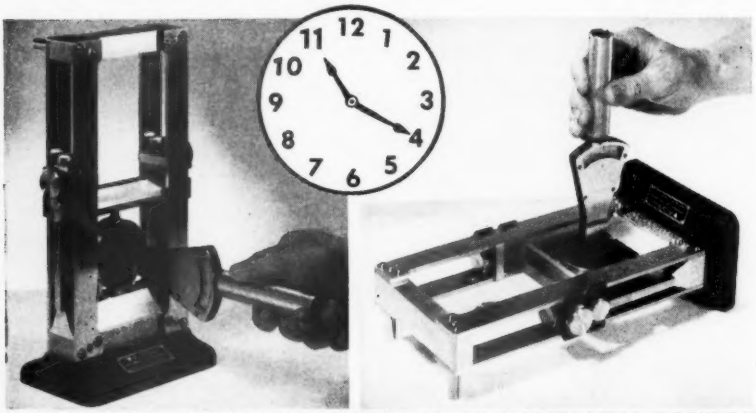
This timely introduction of etched plastic offers an opportunity to conserve critical materials.

For complete details write

Eastern Etching & Mfg. Co.
Grape Street Chicopee, Mass.

LASTING - LEGIBLE - ATTRACTIVE - INEXPENSIVE

SAVE TIME *SET YOUR GAGES THIS NEW WAY!*



• CAN BE USED IN A VERTICAL OR HORIZONTAL POSITION

QUICK, ACCURATE READINGS

This Ellstrom Internal Setting Gage (Patents applied for) was designed to eliminate the old fashioned time wasting method of setting instruments and gages by using clamps and parallels with gage blocks. Its gaging surfaces are processed and finished to millionths in flatness, thereby making possible the ultimate in checking with the minimum of adjustments. For example: if the gage is adjusted for 2" reading and a 1.875" reading is desired, it isn't necessary to make a readjustment; all that is required is to wring a .125 gage block on the bottom surface of the gage, immediately giving a 1.875" check.

The gage illustrated will cover readings up to 6" and models can be made to take care of any specific job within a reasonable range. Constructed of the finest steel, it is simply and quickly adjusted by two thumb screws on each riser. Its base is 4" x 6½" and overall height is 12".

During these critical times when every second counts, and manufacturers are seeking ways of increasing their production, this Ellstrom Internal Setting Gage (Patents applied for) has been an answer to at least one of their problems. Are you taking advantage of this new method? If not, make it a point to write us today for complete information and prices.

• • •

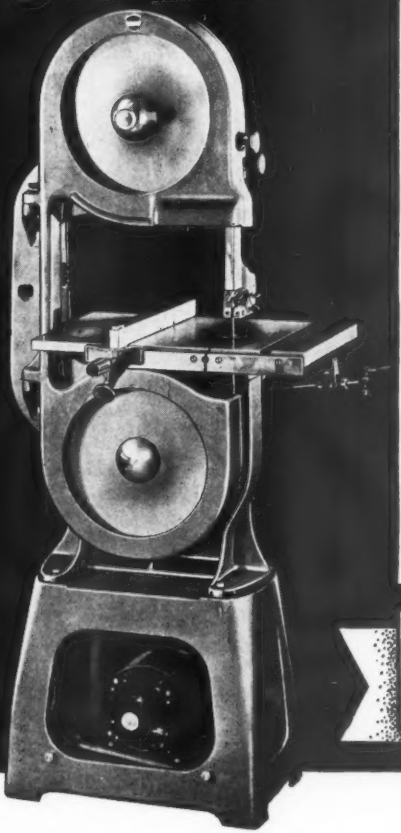
DEARBORN GAGE CO.

22034 BEECH STREET

DEARBORN, MICH.

ELLSTROM
INTERNAL
Setting
GAGE

You're Money Ahead with DURO BAND SAWS Increased Production at Low Cost . . .



These saws are designed and built to give long satisfactory service. Rigid castings — oversize New Departure ball bearings—precision construction —statically and dynamically balanced wheels — all controls and adjustments at front, speed up production.

Equipped with built-in light, tilting table and mitre gauge.

Equally satisfactory for wood, metal, plastic, etc.

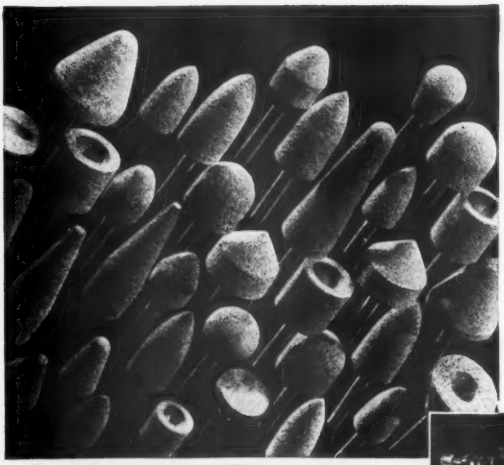
DEFENSE DEMANDS DEPENDABILITY

DURO FOR DURABILITY

DURO METAL PRODUCTS CO.

2649 N. KILDARE AVE. DEPT. TP-19 CHICAGO, ILL.

FINISHING THE *JOB* BEHIND THE LINES



Keeping up with Uncle Sam's victory drive for more tanks and guns and planes, Chicago Mounted Wheels are doing a big finishing job in shops everywhere—taking care of every kind of delicate or tough grinding job faster, smoother and better.

CHICAGO MOUNTED WHEELS

Made of V/T Super Bond, they have real stamina, give unmatched performance and last 150% to 300% longer than ordinary wheels.

Chicago Wheels were the first small wheels mounted on steel shanks. Today there are over 200 different shapes to serve you—made in a variety of abrasives, grains and grades, mounted on shanks of various lengths and diameters of ¼", $\frac{3}{32}$", ⅛" and $\frac{3}{16}$".

Try One Absolutely Free

Tell us the kind of job, size and wheel speed you use, and we'll send you a test wheel postpaid.

HI-POWER GRINDER

A real production grinder that is saving many man hours. Weighs 3 lbs. yet is so well balanced that fatigue is practically eliminated. Has enough power to drive a 2½" diam. wheel. Speed 17,000 r.p.m. In case with 3 Chicago Mounted Wheels, Drum Sander and Bands, extra Collets, Wrenches, Dressing Stone, $38.50.

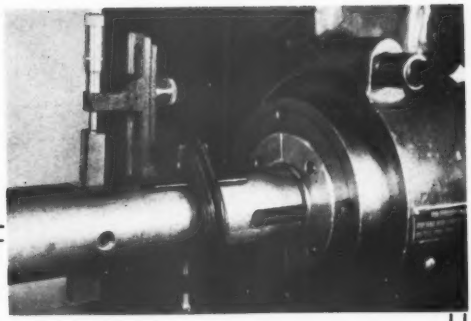
BRAND NEW CATALOG

Just off the press, this book is prepared in the modern manner—loads of illustrations, concise descriptions of the complete line of Chicago Mounted Wheels. Send for copy.

CHICAGO WHEEL & MFG. CO.

Makers of Quality Products for 40 Years

1101 W. Monroe St., Dept. TD, Chicago, Ill.



Bartelt

Tool Setting Gauge

★

Designed for speedy, accurate setting of boring tools and many other tool setting applications.

After rough boring, it is necessary only to clamp the tool setting gauge to the boring bar, bring the micrometer down to the tool tip, using the slide for rough adjustment. Then back off micrometer the number of thousandths required to bore to size, adjust tool to micrometer, lock the tool, remove gauge and proceed with work.

Saves time, labor and costly errors.

A model with a dial indicator instead of micrometer is also available.

USES:

Setting cutting tools in boring bars; Milling machine set-up; Planer set-up; As a height gauge; As a depth gauge; Layout and inspection.

Send for illustrated literature.

BARTELT ENGINEERING COMPANY

1214 Partridge Avenue - - BELOIT, WISCONSIN

Center Scope is an optical locating tool of 45× magnification. It has a broad field and guide lines for centering. It can be used on any machine tool and provides an easy method to compensate for spindle or adaptor run-out.

KEEPING UP TO DATE IS YOUR STOCK IN TRADE!

Getting out in front and *staying there* has always been a wise policy to follow. It's like money in the bank!

The progressive machine tool man employs the newest short cuts on the "last word" in equipment. He's the fellow who "gets the breaks" because his work is more accurate; his speed greater; his rejects, negligible.

Center Scope, the new "locating" tool, fits right into the scheme of things for men who follow this policy.

Center Scope will locate edges or layouts to the spindle axis, even "within a tenth." It is *fast* to use, and the operator can *see* that he is right.

With Center Scope—accuracy becomes a habit *regardless of who uses it!* It is not affected by wear, temperature or mechanical pressure.

Center Scope has many advantages of which price is vitally important. You can get your Variable Center Scope for only $97.00, f.o.b. Los Angeles, California. The Edge Block is $23.00 additional. Orders are filled promptly.

Call your Kearney & Trecker Dealer or write for Bulletin No. 201C.

Center Scope Department
KEARNEY & TRECKER
Corporation
MILWAUKEE · WISCONSIN

The TOOL & DIE Journal
JULY, 1942 Vol. 8, No. 4

Letter from Washington

By George J. Huebner

One for the Other

AMERICAN Industry—management and labor—came to bat with a vengeance and is hitting production home runs all around the lot and even over the fence.

Now American inventive genius will show what can be done to improve old products and methods and develop new ones. This writer, for one, believes that the results will be just as startling and as gratifying.

Self-imposed censorship forbids most of us to talk about achievements which are in the making, but the time is not far distant when knowledge of some of them should be giving "everything but aid and comfort to the enemy".

And that brings us to the purpose of this month's letter.

In February we wrote: "We Are NOT *Winning* the War". This is July and we still are *not* winning the war. "We" must include our Allies and, while our forces in the Pacific have twice given the Japs severe beatings, that has in no wise offset Germany's defeat of the British in North Africa, nor her partial overcoming of Russian resistance, valiant as that is.

Some Americans seem to feel this justifies comments which, although they may appear complimentary and even loyal to the United States, are, because of their tendency to depreciate efforts of our Allies, really destructive to the total cause. If the British Empire stands today in extreme peril, then Our Country likewise is confronted with its most severe struggle for existence as a nation. Among ourselves we are compelled to reckon in terms of "for" or "against". Thus, in regard to Our Country's welfare, there are only two kinds of people in the United States—those who are working for Victory; those who are not. No man (or woman) knows better where he stands than the individual himself. "Working for Victory" includes every possible form of activity. It refers particularly to thought and speech.

We, collectively, are fighting the Nazis and the Japs. Our Allies are fighting not only with us but also for us. If they are losing battles it is not conceivable that it will help our own cause by criticizing their efforts or their mistakes. We need to counsel with them and to encourage them. Every Allied nation, particularly the peoples who comprise them, must be sources of strength—one for the other. All the Allies are fighting for the freedom of their peoples. Freedom means the same in any language, and it will be achieved in the world only as we recognize our obligations one to another.

"United We Stand" seems to have become the Nation's slogan for July. It should be quoted in full: "United We Stand, *Divided We Fall*". This thought, expressed during the American Revolution, brought the original thirteen American colonies to the realization that they would have to renounce their internal strife or they couldn't strengthen their union.

It is just as true today.

A Study of
Maximum Price Regulation No. 136, Effective July 22, 1942
Prepared with the cooperation of Parts and Sub-assemblies Section, Machinery Branch, Office of Price Administration

OPA's New Price Co
Machines and Parts, a

SWEEPING revision of existing price regulations for machines and parts, together with a broadening of controls to cover sub-assemblies, their components and machinery services, was announced July 1 by Price Administrator Leon Henderson.

The changes in the machinery price control structure are embodied in Maximum Price Regulation No. 136, as amended, which supersedes a regulation bearing the same number which was to have gone into effect July 1, 1942.

Maximum Price Regulation No. 136, as amended, covers machines and parts and machinery services. This regulation formalizes informal controls over machinery which were set up during the fall of 1941 and the early part of 1942. These informal controls had covered nearly all industrial machinery, railroad equipment and electrical equipment. The regulation also extends control to parts and sub-assemblies of such machinery and equipment.

"Definition of 'Machines and Parts' and 'Machinery Services.' For the purposes of this Maximum Price Regulation No. 136, as amended:

(a) The term 'machines and parts' means, and is limited to, products falling within the groups listed in Section 1390.32, Appendix A and Section 1390.33, Appendix B. Any other product is subject to the General Maximum Price Regulation unless excluded therefrom or unless subject to some other specific regulation. For purposes of clarification, a list of certain products related to machinery but not covered by this Maximum Price Regulation No. 136, as amended, is contained in Section 1390.34, Appendix C;

(b) The term 'Machinery Service' means any operation in the processing, machining, welding, treatment, finishing, testing, inspecting, adjusting, maintaining, repairing or rebuilding of a 'machine or part' owned by another or of a product owned by another which, as a result of such operation, becomes a 'machine or part.'

"*Exclusions.* This Maximum Price Regulation No. 136, as amended, shall not apply to:

(a) Any sale or delivery of a machine or part or any machinery service for which a maximum price is established by any other regulation or order issued by the Office of Price Administration, except the General Maximum Price Regulations;

(b) Any sale or delivery of a machine or part if, prior to July 22, 1942, such machine or part had been received by a carrier, other than a carrier owned or controlled by the seller, for shipment to the purchaser;

(c) Any sale or delivery of a machine or part or machinery service performed pursuant to a 'developmental' contract or subcontract, as provided in Section 1390.21;

(d) Any sale or delivery of a ma-

...trol Regulations for ...s and Machinery Services

Extends Machinery Controls to include Their Parts and Sub-assemblies; Dies, Molds, Jigs, Fixtures, Patterns, Perishable Tools; Chucks, Mandrels, Collets, Machine Tool Attachments; Screw Machine Products.

chine or part or any machinery service performed pursuant to a "secret" contract or subcontract, as provided in Section 1390.22;

(e) Any sale or delivery of a machine or part or any machinery service performed pursuant to an 'emergency purchase', as provided in Section 1390.23;

(f) Any sale or delivery at retail of a machine or part, except any sale or delivery of a machine or part by the manufacturer thereof. 'Sale at retail' means any sale to an ultimate user other than an industrial, commercial or governmental user, or any sale made at a store or shop where such sales are customarily made;

(g) Any sale or delivery of a machine or part or any machinery service performed pursuant to a cost-plus-a-fixed-fee or cost-plus-a-percentage-of-cost contract: *Provided*, That a report is filed with the Office of Price Administration as provided in Section 1390.14."

The Regulation, as amended, becomes operative July 22, 1942. After July 22, sales will have to conform to the maximum price requirements, regardless of the purchase prices paid. If any deliveries are made at higher than maximum prices, refunds will have to be made prior to September 1.

The changes contained in the amended regulation have been directed almost exclusively to (1) the clarification of the regulation's terms, and (2) the removal of any possible obstacles to the expansion of subcontracting, the attainment of capacity production and the maintenance of special types of contracts for war materials, all so necessary to the war effort.

The regulation, as amended, brings the following changes and additions to the previous measure with respect to coverage and price basing dates:

1. *"Appendix A: Machines and parts to which the October 1, 1941 date is applicable.*

(a) *Prime Movers:*
- Diesel Engines, except aircraft diesel engines
- Gas Engines and Gas Generators
- Gasoline and Kerosene Engines for marine, tractor, railway and stationary use.
- Hydraulic Turbines and Hydraulic Turbine Governors
- Steam Engines and Steam Turbines

(b) *Industrial and Marine Power Apparatus:*
- Boilers, industrial and marine
- Oil Burners, industrial and marine (burning not less than No. 6 oil)
- Soot Blowers and Cleaners, industrial and marine
- Stokers, industrial and marine (1200 lbs. per hour or more)

(c) *Processing Machinery and Equipment:*
- Ceramics Machinery
- Chemical Processing Machinery
- Cotton-ginning Machinery

Die-casting Machinery
Food and Beverage Machinery, including Baking, Canning, Bottling, Confectionery, Brewing, Grain-milling, Meat-packing, Edible Oil, Sugar and Dairy Machinery and Equipment (except dairy farm equipment)
Foundry Machinery
Glass-making Machinery
Hat-making Machinery
Laundry, Dry-cleaning and Clothes Pressing Machinery (except domestic)
Leather-working Machinery
Packaging, Wrapping, Filling and Labeling Machinery
Paint-making Machinery
Petroleum-refining Machinery
Pharmaceutical Machinery
Plastics Molding and Fabricating Machinery
Printing Machinery
Pulp, Paper and Paper Products Machinery
Rod and Wire-working Machinery
Rolling Mill Machinery
Rubber and Allied Products Machinery
Rubber Tire and Tube Machinery
Sewing Machines, Industrial
Shoe Manufacturing and Repairing Machinery
Spring-Winding and Forming Machinery
Textile Preparatory and Finishing Machinery and Equipment (including accessories designed exclusively for use with such machinery)
Tobacco-working Machinery
Woodworking Machinery

(d) *Construction and Mining Machinery:*
Asphalt Mixing Plants
Concrete Mixing, Placing and Finishing Equipment
Cranes (overhead, crawler, and locomotive), Hoists and Derricks
Crawler and Non-Agricultural Tractors
Core Drilling Machinery
Excavating and Earth-Moving Machinery (including Power Shovels, Ditchers, Draglines and Power Scrapers)
Dredging Machinery
Heaters, Stone, Sand or Bitumen
Mining Machinery (including Mine Cars and Trucks)
Oil Well Equipment
Ore-Crushing and Concentrating Machinery
Portable Power Driven Tools
Road Building and Maintenance Machinery (including Graders, Pavers, Rollers, etc.)
Rock Crushers
Snow Plows
Spreaders
Well-Drilling Equipment

(e) *Electrical Equipment:*
Airways Lighting
Arc and Resistance Welding Equipment, Electrodes and Supplies
Capacitors
Carbon, Graphite and Metal Graphite Products for Electrical Uses
Circuit Breakers
Commercial Lighting Equipment
Communication Equipment including Telephone, Telegraph, Signalling Apparatus and Public Address Systems
Conduit Fittings
Electric Motors, Generators, and Renewal Parts (except automotive)
Electric Motor-Generator Sets
Electric Storage Batteries
Electrical Control Equipment (including Magnets and Renewal Parts), except control devices used for domestic installations
Electrical Industrial Heating Units and Devices
Electrical Power Conversion and Rectifying Equipment of any type or size
Electrical Wire, Cable and Cable Accessories (except when subject to Revised Price Schedule No. 82 as amended)
Feeder Voltage Regulators
Flood Lighting Equipment
Fuses for the protection of electrical equipment
Industrial and Marine Electrical Lighting Equipment
Instruments for Measuring Electrical Quantities (except automotive)
Knife and Enclosed Switches
Lightning Arrestors
Magnetos
Metallic Outlets and Switchboxes
Metallic and Non-Metallic Ducts
Outdoor and Indoor Substations
Panel and Distribution Boards, ex-

cept asbestos and cement boards
Searchlight Equipment, except completely assembled military searchlight equipment
Special Electrical Metals and Alloys (except steel with less than 6% alloy content) in any fabricated form used for electrical resistance, magnetic or glass sealing purposes, including Special Contact Alloys and Special Filament Coated Iron Wire
Street and Highway Lighting Equipment
Switchgear and Switchgear Accessories
Synchronous Condensers
Transformers, including Specialty Transformers
Trolley Line Material
Turbine Generator Sets
Wiring Devices
X-Ray and Electro-Therapeutic Apparatus

(f) *Railroad Equipment:* (for Steam and Electric Railroads and Surface, Elevated and Underground Railways)
Freight Cars
Passenger Cars
Locomotives and Tenders (including mining and industrial)
Car and Locomotive Parts and Specialties, including:
Bearings, Truck Side
Boilers, Fireboxes, Front Ends, and Cabs, and Fittings, Fixtures, Devices or Appliances mounted thereon
Brakes and Brake Gear
Coupler Devices or Attachments
Devices and Appliances mounted on locomotives for treatment, distribution and control of water, fuel, steam, sand and electricity
Doors and Fixtures (except those subject to Revised Price Schedule No. 40—Builders' Hardware and Insect Screen Cloth)
Draft Gears, Buffers and Attachments
Driving, Foundation and Running Gear
Heating, Lighting, Ventilating and Air Conditioning Equipment
Journal Boxes, assembled
Lubricating Devices
Miscellaneous Fittings, Fixtures, Specialties, Devices or Appliances designed specifically for use on cars or locomotives (not including artillery or other exclusively military or naval equipment designed for mounting on cars or locomotives)
Safety Appliances and Warning Devices
Sides, Roofs, Ends, Running Boards, Brake Steps
Spring Rigging, Snubbers, Shock Absorbers
Steel Tires
Train Control Apparatus
Trucks complete
Underframes
Wheels, cast iron and spun steel
Machines, Tools, Devices and Appliances designed specifically for the installation, operation, maintenance and protection of tracks, yards, signals, rolling stock and motive power
Signal Equipment, including Highway Crossing Signals
Stationary Plants for handling fuel, sand, water and cinders

(g) *Auxiliary Equipment:*
Air-Conditioning Equipment (25 tons capacity or over)
Dust Collecting Equipment, industrial
Furnaces and Ovens, industrial
Heat Exchange Equipment and Pressure Vessels, industrial
Lubricating Sytems and Devices, industrial
Metal Marking and Numbering Machines
Material Handling Equipment, industrial (Cars, Trucks, Racks, etc.)
Refrigerating Equipment (25 H. P. or over)
Water Softening and Purifying Equipment, industrial

(h) *Miscellaneous:*
Elevators and Conveyors
Fans and Blowers (including Domestic Hot Air Furnace Fans), except pedestal, portable and ceiling household and office fans
Gas Welding and Cutting Equipment
Gyroscopes
Mechanical Instruments, for measuring, testing, recording or indi-

cating, including aircraft, marine, scientific, laboratory, and precision instruments, not including carpenters' tools or surgical, optical and dental instruments)
Portable Heating, Melting, Burning and Thawing Equipment
Pumps and Compressors, except automotive, hand operated and farm pumps
Surveying and Drafting Instruments (not including school, art and office supplies)
Weighing Scales, industrial and platform
Valves, automatic

(i) *Miscellaneous Parts and Sub-assemblies:*
Anti-friction Bearings
Bi-metallic Thermal Strips, fabricated
Chains, sprocket, roller and silent
Ferrous Forgings, all types, as sold by the forger (whether machined or rough)
Galvanometer and Pyrometer Movements
Gears, Pinions, Sprockets and Speed Reducers (except when subject to Revised Price Schedule No. 105, as amended)
Industrial Clockwork Systems used in connection with mechanical instruments
Industrial Power Transmission Equipment (belt tighteners and shifters, clutches, couplings and collars, hangers and brackets, motor bases, pillow blocks and bearing housings, pulleys and sheaves, universal joints, variable speed drives)
Springs for Mechanical Instruments

(j) *Parts and sub-assemblies of any item set forth in this Appendix A when manufactured by the manufacturer of the complete item.*

2. *"Appendix B: Machines and parts to which the March 31, 1942 date is applicable.*

(a) Any part or sub-assembly of any item mentioned in Section 1390.32, Appendix A, when manufactured by a person other than the manufacturer of the complete item. This does not include any part or sub-assembly which is itself covered in Appendix A or which is mentioned in Section 1390.34, Appendix C.

(b) Any part or sub-assembly of any industrial machinery or equipment not mentioned in Section 1390.32, Appendix A, unless such part or sub-assembly is itself covered in Appendix A or is mentioned in Section 1390.34, Appendix C. 'Industrial machinery' means any machinery or equipment used in the extraction, production, or processing of commodities for any use, but does not include mobile or field units, motor vehicles or trailers, farm equipment as defined in Section 1361.9 (a) (3) of Maximum Price Regulation No. 133—*Retail Prices for Farm Equipment* (7 F.R. 3185), or any product mentioned in Appendix C.

(c) *Miscellaneous:*
Brushes, Industrial Power-Driven
Chucks, Mandrels, Collets, and Machine Tool Attachments
Dies, Molds and Patterns (when sold separately and delivered)
Gaskets and Packing
Governors
Ground Steel Stock for Punches, Dies, Jigs, Fixtures, etc.
Jigs and Fixtures
Machine Knives, Machine Shear Blades and Power Driven Saw Blades
Military Searchlights, completely assembled
Neon Indicator Attachments
Perishable (Expendable) Tools
Porcelain and Steatite Insulators
Radio Transmitting and Receiving Apparatus, including Electronic Devices for sound recording, sound and direction detection, communication, controlling and measuring, Electronic Tubes, vacuum gas filled, and similar Light-Sensitive Devices, for applications other than sun lamps, light sources and domestic radio receivers (See Revised Price Schedules No. 83—*Radio Receivers and Phonographs* and No. 84—*Radio Receiver and Phonograph Parts.*
Screw Machine Products (except those covered by Maximum Price Regulation No. 147—*Bolts, Nuts, Screws and Rivets*
Sharpening and Filing Equipment

3. *"Appendix C: Illustrative list of*

products not covered by Maximum Price Regulation No. 136.

(Note: Maximum prices for the following products are established by the General Maximum Price Regulation or by other price schedules, regulations, or orders issued by the Office of Price Administration)

Abrasive Wheels
Aircraft Gasoline and Diesel Engines
Automotive Electric Motors and Generators
Automotive Gasoline Engines
Automotive parts and sub-assemblies (except batteries) manufactured prior to 1942 or authorized by the War Production Board to be manufactured in 1942, when such parts and sub-assemblies are sold for use in private or commercial motor vehicles of 1942 or earlier models
Automotive Pumps
Bolts, Nuts, Screws and Rivets (as defined in Maximum Price Regulation No. 147)
Carpenter's Tools
Castings, Ferrous and Non-Ferrous, as sold by the foundry, whether rough or machined
Christmas Tree Lighting Sets
Dairy Farm Equipment
Domestic Electrical Appliances (except fans and blowers)
Domestic Furnaces
Domestic Laundry, Dry-cleaning, and Clothes Pressing Machinery
Domestic Radios and Phonographs
Domestic Stokers
Drill Pipe, Casing and Tubing
Dry Batteries
Electrical Control Devices used for domestic installations
Farm Pumps
Flashlights
Frames, Bolsters, Couplers and Yokes (as defined in Revised Price Schedule No. 41—*Steel Castings)*
Hand Hoist Chains
Hand Tools
Hand-Operated Pumps
Household Machines
Incandescent and Fluorescent Bulbs and Tubes
Iron and Steel Products (as defined in Revised Price Schedule No. 6)
Manual Valves
Mechanical Rubber Goods (as defined in Maximum Price Regulation No. 149)
Non-Ferrous Forgings
Office Machines
Photographic Equipment
Porcelain Bushings
Portable, Pedestal and Ceiling Household and Office Fans
Portable Lamps
Radio Receiving Set and Phonograph Parts not primarily designed for commercial, police, or military use, or for use in the Navy or Merchant Marine (See Revised Price Schedule No. 84—Radio and Phonograph Parts)
Reducing Bushings
Round Link and Coil Chains
Rubber Belts and Belting
Surgical, Optical and Dental Instruments
Washers
Watches and Clocks (except Industrial Clockwork Systems used in connection with mechanical instruments)"

4. The basing date to be used in determining maximum prices for machinery services is March 31, 1942 and Regulation 136 includes a number of services previously in the General Maximum Price Regulation.

The regulation as amended makes the "base date" for all machinery services March 31, 1942. Machinery service suppliers were known to have had some labor rate increases between October and March which they would have found it difficult and in many cases impossible to absorb because of the high proportion of their costs accounted for by direct labor cost. It was felt desirable to include, within the scope of the regulation, certain machinery services other than machine work such as testing, inspecting, maintaining, repairing and rebuilding machines and parts, which had hitherto been within the area covered by the General Maximum Price Regulation. For these reasons, the maintenance of the October 1, 1941 base date was considered unwise.

As a corollary to this change, the pricing formula for manufacturers of special machinery who make use of outside machinery services was modified to allow use of actual rates paid not to

exceed the maximum rates, instead of the rates in effect on October 1. Thus, the "farming out" of certain operations will be encouraged rather than discouraged.

Like the machinery service suppliers, most manufacturers of parts and subassemblies, many of whom had been completely exempted from the original regulation, are now subject to a March 31, 1942, base date under the regulation as amended. Parts and sub-assemblies generally, along with certain tools and accessories, now appear in the category of specifically named machines which carry the later date. In general, only parts which were brought under informal price control in the fall of 1941 and the early months of 1942 remain in the list of specific machines basing maximum prices on October 1, 1941. In this category are parts made by the manufacturers of the complete machines which are covered and certain specified items where subcontracting was of little importance.

In the case of parts and sub-assemblies, as well as machinery services, manufacturers of special machinery are no longer required to use October 1, 1941 prices for such parts as they buy in calculating their own maximum prices, but may enter these parts at their actual prices, not to exceed Office of Price Administration maximums.

Maximum Prices and Pricing Formula

It is to be noted that while in the following Sections the date October 1, 1941 is repeatedly used, this, in fact, means that in pricing machines and parts listed on Appendix A, the date October 1, 1941 must be used, *while in pricing machines and parts covered by Appendix B the date March 31, 1942 must be used.*

"Maximum prices: sales by the manufacturer of machines or parts with list prices. If for any machine or part the manufacturer thereof had a published or confidential list price in effect on October 1, 1941, the maximum price shall be determined as provided in Section 1390.5.

"Maximum prices: sales by the manufacturer of machines or parts without list prices. If for any machine or part the manufacturer thereof had no published or confidential list price in effect on October 1, 1941, the maximum price of such machine or part to any purchaser shall be computed on the basis of the following:

(a) *Pricing formula:*

(1) The price-determining method which was in use on October 1, 1941, applying the overhead rate, machine hour rates, if any, or other bases of computation which were in use on that date. If no such method was in use on October 1, 1941, the manufacturer shall use the method which would have been used on that date, applying the overhead rate, machine hour rates, if any, or other bases of computation which were in use or would have been used on that date. For the purposes of this subparagraph (1), the method of determining the total price in a cost-plus contract shall not be deemed to be a 'price-determining method';

(2) To the extent that the price-determining method includes or is based on direct labor costs, the manufacturer shall use labor rates in effect on October 1, 1941, determined and applied in accordance with the provisions of paragraph (b) below:

(3) To the extent that the price-determining method includes or is based on prices paid for materials, the manufacturer shall use material prices in effect on October 1, 1941, determined and applied in accordance with the provisions of, and subject to the exceptions contained in, paragraph (c) below;

(4) To the extent that the price-determining method includes or is based on prices paid for subcontracted machinery services, the manufacturer shall use actual prices paid or to be paid for subcontracted machinery services, not in excess of maximum prices provided by this Maximum Price Regulation No. 136, as amended, determined in accordance with paragraph (c) (4) below;

(5) To the extent that the price-determining method includes freight rates paid, the manufacturer shall use freight rates in effect on March 31, 1942, for outbound shipments for the mode of transportation actually used and for inbound shipments for the mode of transportation actually used and from the actual point of origin;

(6) For the labor required for installation if the machine or part is sold on an installed basis; labor rates in the area of installation in effect on or resulting from an agreement concluded or from a grant made or announced on or before April 27, 1942, or, where the wage stabilization agreement issued May 22, 1942, between the Building and Construction Trades Department of the American Federation of Labor and certain agencies of the United States is applicable, labor rates in effect on July 1, 1942;

(7) All applicable extra charges, discounts or other allowances in use on October 1, 1941, to a purchaser of the same class.

(b) *Labor rates:*

(1) 'Labor rates in effect on October 1, 1941' are the labor rates prevailing on that date in the manufacturer's plant for each classification of labor. If the manufacturer employs labor of a particular classification not employed in such plant on October 1, 1941, he shall apply the rate prevailing on that date for such classification in the locality in which the manufacturing is to be performed. If labor of such classification was not employed on October 1, 1941, in such locality, the manufacturer shall apply the rate prevailing on that date for the nearest skill in the nearest comparable locality, as accurately as he is able to determine the same by reasonably diligent inquiry.

(2) The permitted labor cost to be used in the pricing formula provided in paragraph (a) is to be determined by applying to the clock hours of each classification of labor estimated to be required on the basis of previous production experience, or, where an estimate is not used, the clock hours actually required, the hourly rate for such classification in effect on October 1, 1941. If on October 1, 1941, an average rate was used, an average rate may be applied: *Provided,* That the labor rates and the method of computing the average in effect on October 1, 1941, are used. If individuals have been or are promoted from one classification to another because of increased efficiency, the higher rates may be used: *Provided,* That such higher rates may not be used if they result in increased prices.

(3) In determining the price for a firm price contract, the amount of overtime estimated to be required in excess of that provided for in the overhead or machine hour rate may be added to the estimated cost of labor. Further, the amount of overtime actually required in an unforeseen contingency, over and above the amount estimated, if any, may be added to the price if the purchaser agrees and if it is billed separately: *Provided,* That no markup, overhead, or profit shall be applied to that part of the labor cost which is in excess of the straight-time cost, except that no adjustment of the overhead rate or machine hour rate in effect on October 1, 1941, shall be required.

Requests for copies of Maximum Price Regulation No. 136, as amended, and for additional information about its provisions should be addressed to Earl C. Hald, Acting Chief, Parts and Sub-assemblies Section, Machinery Branch, Office of Price Administration, LaSalle Building, Washington, D. C.

(c) *Material prices:*

(1) The term 'material prices' includes the prices for raw materials, and for materials or products which have been processed or fabricated to any degree, including parts and sub-assemblies.

(2) The permitted material cost to be used in the pricing formula provided in paragraph (a) is to be determined by applying material prices as determined in subparagraph (3) below to the quantities of materials estimated to be required on the basis of previous production experience or, where an estimate is not used, the quantities actually required.

(3) Except as provided in subdivisions (i) and (ii) below, the manufacturer shall use the lower of the following two prices: the price for the material which was or would have been paid by him on October 1, 1941, or the actual price for such material paid or to be

(Continued on Page 104)

Proper Grinding Cures

Drill Troubles

by L. B. Brackett, Tool Supervisor
Noblitt-Sparks Industries
Franklin, Indiana Plant

The Noblitt-Sparks Industries, Franklin Branch, encountered many difficulties in converting their plant to war production. Mr. Brackett, a tool supervisor, worked with these difficulties at the Noblitt-Sparks plant and has been kind enough to prepare this article in the hope that manufacturers in a similar situation may benefit by his experience.

Drills used in the newly created automatic screw machine department at Noblitt-Sparks were being returned for replacement with bent shanks, broken flutes, bands that were chipped, galled and ground away, drills ground off center, etc. The operators were unfamiliar with the work and time was short so drastic steps were necessary to solve this problem. It was decided to call the personnel in for an hour's discussion between the first and second shifts. The third shift was contacted separately the following morning. No one was blamed or criticized but everyone participated in a round table discussion stressing the importance of drilling and its effect on quality and performance. Just 24 hours after the first discussion, production stepped up considerably and the tool room report showed no breakdown or mishaps with drills. The atmosphere of the department was changed. Spirits were high as if a production battle had been won. *The Editor.*

Fig. 1 — The Parts of a Twist Drill

THE average shopman looks on drilling as a roughing operation and minimizes its importance. As a matter of fact, the accuracy of a drilled hole is determined by its start in the work and for this reason drilling should be thoroughly understood.

A drill is divided into three principal parts: the shank, the body and the point. The shank and the body are not destroyed, under ordinary conditions, hence the main concern of the shopman is the point or entire cone shaped end of the drill. Ninety five percent of all drill troubles are traced to faulty grinding of either the point or lip clearance. The suggestions made here were found in actual shop practice to eliminate a major portion of these difficulties.

Lip Clearance

The drill must have enough clearance to adequately care for the amount of feed per revolution. The clearance angle must increase as the center of the drill is approached. The reason for the latter is that the diameter traveled through a given point near the center is much smaller than the diameter traveled by a point at the outside of the drill. The amount

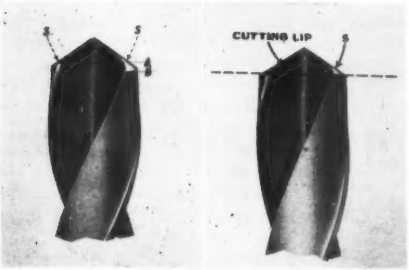


Fig. 2—Left—proper lip clearance —Right—improper lip clearance

of advance per revolution is the same for the two points. It can be seen, therefore, that the drill lip angle of advance into the work increases as the center of the drill is approached.

As an example, the angle of advance of a one inch diameter drill with a feed of .015 revolution is 0° 17 minutes at the periphery, while the angle of advance at a point one-eighth inch from the center is 1° 6 minutes. Naturally the lip clearance must be increased from the periphery to the center in approximately the same proportion.

The clearance angle must be considerably greater than the angle of advance so that a comparatively thin edge is presented to the work. At the same time the amount of clearance must not be too much or the cutting lip will be weakened. Further, the cross section will be reduced behind the cutting edge so that the capacity for conducting away the heat generated is materially lessened. It should be remembered that the materials to be drilled have a bearing on the amount of lip clearance required as the feed per revolution that is permissible will vary.

For drilling steels, the lip clearance at the periphery of the drill should be from 7° to 9°, while for cast iron and for soft materials, the clearance should be 12° to 15°.

Point Angle

The included angle of the points of drills has been established at 118° for general purpose work. In some steels it has been found, however, that a larger angle works more satisfactorily. Where there is a tendency for the drills to push out a bulge when breaking through the work and leave an objectionable burr, a point angle of 135° to 145° will tend to eliminate this condition. A little experimental work will indicate the best point angle for a given job. When drilling some cast materials, notably certain grades of cast iron, it is found that a smaller point angle is desirable. Cases are on record where a point angle of 60° is found most satisfactory for drilling cast iron. This, however, is the extreme limit and should not be exceeded.

Web Thinning

The web of a drill is the non-cutting portion. This web is literally pushed through the work by the end pressure of the drill. It follows, therefore, that the web at the point should be made as thin as possible. The strains imposed on a drill, however, necessitate a web of considerable thickness. This maintains its rigidity and tends to securely join the two cutting edges. Extreme care must be exercised in thinning the web or the cutting efficiency of the drill will be impaired. The two cutting edges must be maintained at the same length and care taken to avoid grinding away the rake of the lips. Generally speaking, the web can be reduced to one-half its original thickness without danger, provided the thinning is done at the immediate point only.

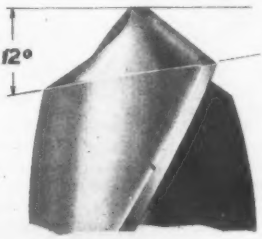


Fig. 3—The lip clearance angle is measured at the circumference of the drill.

Lip Shape

It is sometimes necessary to alter the shape of the lips of the drill in order to break up the chips so they will be readily ejected. If a curled chip is desired, grind more rake on the face of the lips. Care must be taken not to overdo this as it weakens the lip. By straightening up the

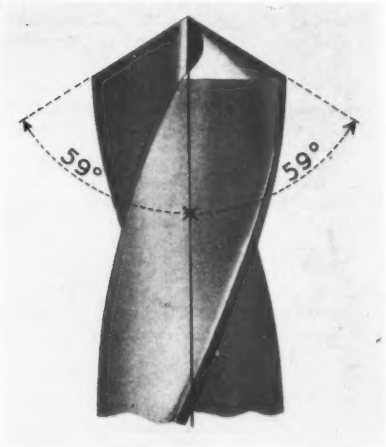


Fig. 4 Correctly Ground Lips

face of the lips or decreasing the rake the chips will tend to break up in smaller pieces. This lowers the efficiency of the drill but sometimes is necessary to clear the chips from the hole. The planning of drilling operations often fails to take into account the depth of hole to be drilled, and its influence on permissible rates of feeds and speeds.

If the hole to be drilled equals or exceeds three times the diameter of the drill, the operation falls in the deep hole drilling class and some adjustment of feeds and speeds is necessary in order to secure maximum efficiency.

In its final analysis it is entirely a matter of conducting away the heat generated and to prevent its accumulation. It is an evident fact that if less heat is conducted away than is generated, the drill will eventually overheat and be destroyed. The proper lubricant of abundant supply and of sufficient pressure to reach the cutting edge at all times helps carry away heat. A drill in operation just a few second without lubrication will necessitate grinding of the drill two hours before otherwise required.

While the nature and amount of coolant applied to a given drilling operation will affect the depth of the hole that can be safely drilled at the feeds and speeds given below, the previously mentioned depth of three diameters is a good point to begin the stepping down. This applies particularly to speed. The table below will serve as a guide to the proper reduction as the depth of hole increases.

SPEEDS

Depth of Hole				Reduction of Speed
3	times drill diameter		.....	10%
4	"	"	.....	20%
5	"	"	.....	30%
6 to 8	"	"	.....	35% to 40%

FEEDS

Depth of Hole				Reduction of Feed
3 to 4	times drill diameter		.....	10%
5 to 8	"	"	.....	20%

If excellent cooling conditions are present, the above rates may be increased.

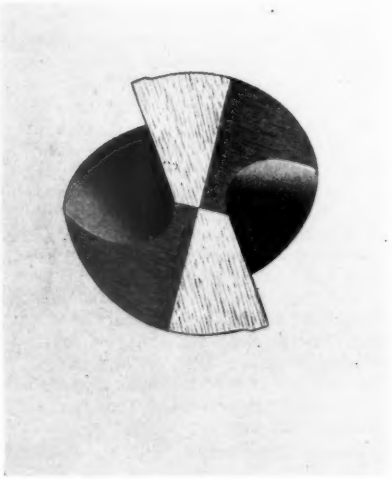


Fig. 5 The "Web" — Top View

Always keep in mind that a somewhat lower rate, constantly maintained, will show more production per day than a high rate with long and frequent interruptions.

(Illustrations courtesy Cleveland Twist Drill Co.)

Production Stepped-Up with Tractor Type Conveyor

OF interest to many manufacturers now engaged in war production is a new conveyor system recently introduced by the Richards-Wilcox Mfg. Co.

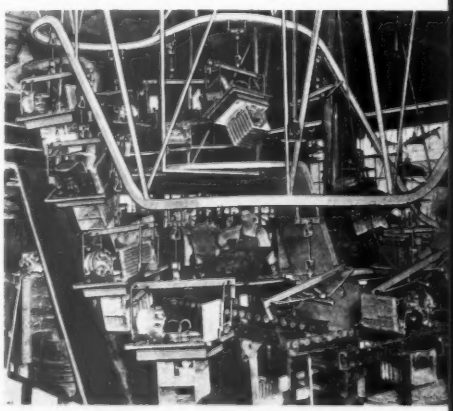
Load Capacity — 125 Pounds Per Foot

This new conveyor consists of a steel tubular track in which is a continuous chain made up of a series of vertical and horizontal wheel units. The vertical wheels are connected by an axle through the side plates of the unit frame. The horizontal unit is made of a wheel and link—the wheel bearing on the inside of the track when rolling around a horizontal curve. The vertical wheel units carry the load, ride the bottom of the track on horizontal runs, roll under the top of the track on vertical curves and turn upward or straighten out from downward to horizontal movement. The two sets of wheels keep the chain assembly in the centerline of the track. A 2′ radius is standard construction. The conveyor will handle 65 lb. per ft. of length in single suspension, 125 pounds with double suspension.

Tractor-Type Drive

The wheels are on 6″ centers with vertical and horizontal units connected by pins and hardened bushings. The design approximates that of a double universal joint equipped with wheels. The load is carried on pendants under each vertical unit. No sprockets are required at the curves and forward movement is by a drive unit mounted in a convenient location at any point in the closed circuit. This drive consists of a continuous tractor-type chain with fingers to engage the conveyor chain through a slot in the track. The drive equipment with its standard motor, reduction gears and shear pin is available for variable or constant speed. It assembles on a plate to which a slotted section of the track is attached. It suspends from four bolts and is connected into the track circuit by special joint brackets at each end of its track section.

Complete information is available in 36-page Catalog A-78, "The New R-W Production Line Conveyor." This illustrates typical installations and gives brief data to show conditions under which application can be made, description of chain and drive and sectional drawings. Address the Richards-Wilcox Mfg. Co., Dept. 5, Aurora, Ill.



A Series—VII

Modern Milling Fixture Design

by C. W. Hinman
Designing Engineer

IN discussing milling fixtures, we will begin by considering some of the simplest milling operations. The views in Fig. 32 illustrate two methods of feeding work against the revolutions of the cutting teeth. Drawings *A* and *B* show "climb milling" and conventional milling respectively. Both of these methods refer to the direction the work is fed in relation to the direction in which the cutting teeth revolve. In climb milling, the work is fed in the same direction that the cutting teeth revolve while in conventional milling this condition is reversed and the work is fed against the direction of the revolving teeth. Climb milling is a method of comparatively recent introduction.

The success of climb milling operations depends largely upon using a milling machine of very rigid construction and the slide-ways under the table should have extra long surfaces for positive bearings. Tables fed hydraulically are best suited for this operation. Climb milling is most effective for producing clean-cut sharp serrations but the cutter must be provided with teeth of a shape best suited to this operation. The teeth should be of spiral types, as angular sharp pointed slender teeth would immediately dig into the work and break at first contact. Slender pointed teeth, however, stand up well in the conventional types of milling if the work feed between the tooth contacts is not too great. Designing milling cutters is like designing gears in that the number of teeth per inch of cutter diameter is of utmost importance.

Types of Milling Cuts

Figs. 33 to 39 inclusive are taken from drawings which have been loaned by the Illinois Tool Works. Fig. 33 shows a simple but important milling operation. It is cutting the slot for seating a Woodruff key in the shaft shown at *C*.

The shaft is held between hardened jaws in a standard milling vise. The slot is cut straight down into the shaft a distance determined by a stop set against the upward travel of the knee under the milling machine table. Woodruff key cutters must have a radius equal to the radius of the arc on the bottom of the key. The thickness of the cutter and key are approximately equal. These conditions make good fits possible when the key is seated in its slot. At *D* is seen a vertical sectional view taken longitudinally through the cutter and the cut. It shows the depth and radius of the cut just described.

Another common milling operation is shown in Fig. 34. In this setup a spiral end mill is ready to finish the rough sur-

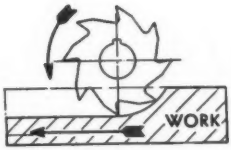
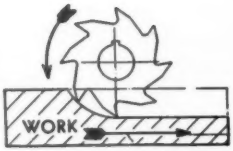


Fig. 32—The two methods for making milling cuts. The one on the left is called "climb milling," while in the right hand view conventional milling is shown.



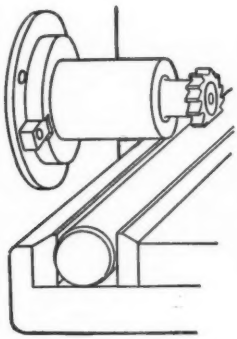
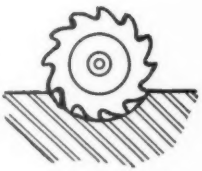


Fig. 33—Two views of a standard Woodruff keyseating cutter in operation. These cutters are made in two styles: the solid shank type and the arbor type. The arbor type has staggered teeth, but the sides of teeth are not sharpened, they have a slight back clearance which enables them to maintain size. The cutters are usually made 1/32 in. diameter oversize to allow for sharpening.



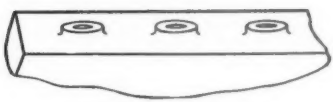
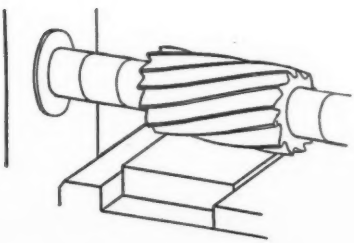
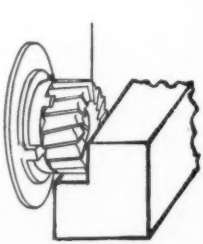


Fig. 34—Straight shank cutter for mill finishing surfaces of bosses on work.

Fig. 35—Heavy duty, left hand spiral, plain milling cutter, taking a "slabbing" cut on the broad surface of a block held in a vise.

Fig. 36—Shell-end milling cutter machining a shelf in a block of work.





face of bosses on castings or forgings. This operation is frequently necessary to prepare gaging points for subsequently registering the work piece against gaging surfaces in a jig for drilling and tapping required holes.

The milling operation shown in Fig. 35 requires a heavy duty milling machine and plenty of driving power. The overarm attached on the machine is not shown here but extends over the arbor and cutter and is parallel to them. It terminates in an outboard bearing around the arbor in front of the cutter and its purpose is longitudinal support for the cutter during the cutting interval.

An important feature here is that the cutting teeth are spiral, which provide an angular shearing cut across the work, considerably reducing the driving power required. The helix angle of the spiral (usually 25°), cut left hand, delivers all the end thrust of the cut against the spindle bearing of the milling machine. The teeth have a 12° rake and generously sized fillets at the roots of the teeth take care of chip curl.

A shell-end mill is illustrated in Fig. 36. These cutters have a counterbored center hole and are held on an arbor with a large head screw. They are driven by a keyway shown across the back of the cutter. Shell-end mills are used for either surface or end milling and the flutes are cut spirally to curl the chips. They are made right hand and cut with right hand spiral flutes, or left hand cut with left hand spiral flutes.

Fig. 37 shows a standard slitting saw cutting thin stock. These saws are driven by a keyway in the center hole. The key should extend into both collars on each side of the saw. Both sides of slitting saws are ground concave for clearing the sides of teeth in deep cuts. Fine pitch teeth should be used for cutting thin stock. A coarse tooth saw is necessary for deep slots. A standard slitting saw having side teeth for chip clearance is used for wider slots than

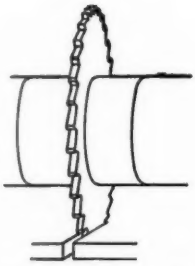


Fig. 37 — Standard slitting-saw in operation, cutting thin stock.

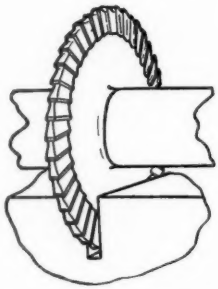
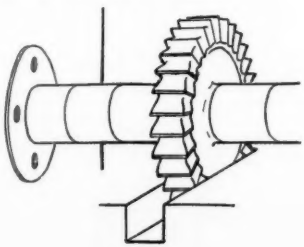


Fig. 38 — Standard slitting-saw having side teeth for chip clearance, shown in operation cutting a deep narrow slot in a block.

Fig. 39 — Side milling cutter with rake teeth shown in the operation of cutting a long slot in a block of work.



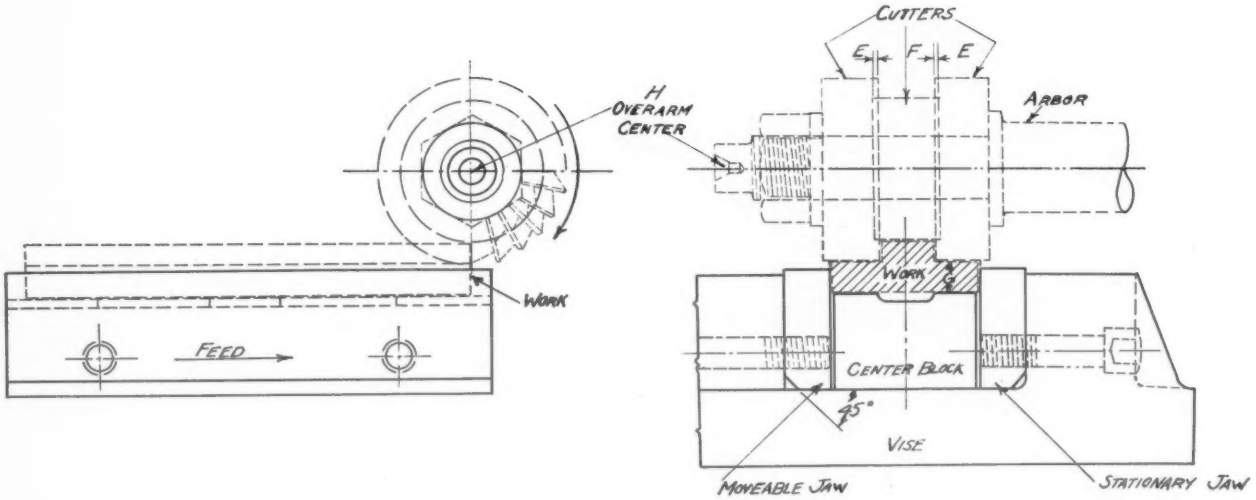


Fig. 40 — A standard milling machine vise equipped with hardened jaws for holding work in a straddle milling operation.

can ordinarily be made with slitting saws. This type is seen in Fig. 38. The teeth are cleared in deep cuts by the relief circle shown around the inner ends of the teeth. The depth of this relief is about $\frac{1}{32}$" more than the depth of the side teeth.

If still wider slots are desired a regular side milling cutter with rake teeth may be employed. This cutter (Fig. 39) is an all around dependable tool and is probably used more frequently than any other type of milling cutter. These cutters are often used in gangs for slotting or straddle milling cuts.

A standard milling vise, shown in Fig. 40, represents the most popular fixture known for holding many different types of work in milling machines. The jaws are tightened on the work by a long heavy screw operated by a crank handle outside the vise. Some vises are closed on the work by quick action cam levers. In other vises the jaws are clamped and released by compressed air. About 90% of all the work done in milling machines is held in a vise. Very clever designs for the jaws can be made for holding work in milling vises. Some of these designs are shown in Fig. 41.

In Fig. 40 attention is directed to the gang of three milling cutters, where dimension *E* shows that the length of the middle cutter extends into each of the two side cutters. This feature provides a cutting corner for both sharp corners at the top of the work and is often erroneously called "interlocking." Interlocked cutters, on the other hand, have teeth which are notched together all the way through to their cutting points. The advantage of this is that the width of cut *F* can still be maintained after grinding the cutters. This is done by shimming out the side milling cutters by inserting thin sheet metal washer around the arbor and at both ends of the middle cutter.

A center block is used between the jaws for supporting the work. This block is relieved so that the work bears at six points. Five surfaces are milled in these vise jaws simultaneously.

When setting up this job a gage block is used between the cut and the center block at point *G*. A centering spindle inserted in the outboard bearing of the overarm engages in the centering spot shown at *H*. The purpose of the overarm and centering spindle is for a longitudinal support of the cutter gang while milling. Bevels of 45° shown on the lower corners of the jaws clear the fillet in the stationary corner of the vise. With both jaws beveled they can be interchanged in the vise if necessary.

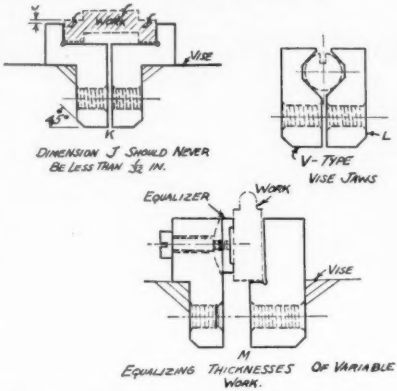


Fig. 41 — Types of vise jaws for clamping various shapes and conditions of work.

K (Fig. 41) shows the overhang type of vise jaws which are used when the vise will not open far enough to admit the work. There are several variations in the design of these jaws.

The jaws shown at *L* are designed to clamp and centralize round work in V-slots. The shapes of the V-slots can be varied to take triangular, octagonal and other cross sectional shapes.

At *M* an equalizer is employed for taking up thickness variations in the work. The equalizer is seated in the movable jaw in a similar manner as seating Woodruff keys. The jaws at *L* and *M* can be designed to suit a large variety of conditions.

(Drawings courtesy Illinois Tool Works)

Caboose – SYMBOL OF AN END

TODAY, long freight trains cross and recross the country in ever-increasing procession, proof of America's all out war effort. How familiar, the experience of waiting behind gates at a rail crossing for a train to pass, impatiently anticipating the sight of that little red house on wheels—the caboose—symbolizing the end of the train and our release.

Private industry, too, must await that release; for the gates, of necessity, were put down to halt individual enterprise for the duration. The problem of arming the allies has welded the united efforts of many peoples into a single purpose for national *offense*.

We, the Precise Tool and Manufacturing Co., are some of those people and we are happily aware of the job we are fitted to do in the war program. Trained to the exacting precision of the automotive industry, our skilled workmen and modern plant facilities have effortlessly fitted into the schedule of concentrated war time production.

But the gates won't be down permanently and we are looking forward to the day when this biggest job of all is successfully completed and we can again supply private industry with the precision instruments of tomorrow that today belong to Uncle Sam.

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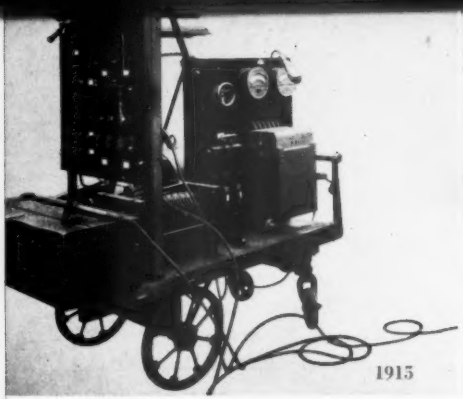
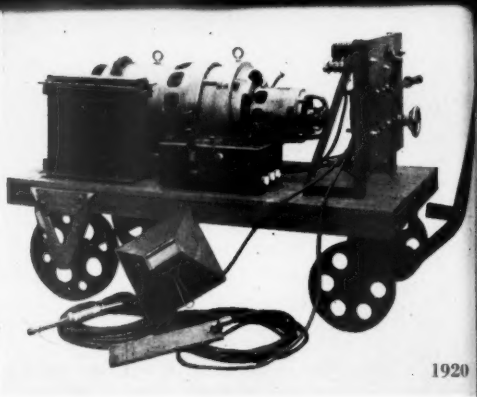


1915



1920

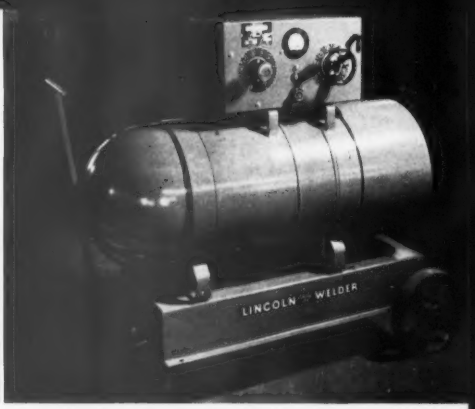
He Who Serves Best Will Profit Most

TODAY it is possible to buy a better welding machine for $200 than was produced in 1915 for $1,550. Electrodes can be purchased for 4.8c per pound in comparison with a 1934 price of 11c per pound.

These facts were brought out by a recent Congressional hearing. The immediate reaction to such facts would be "how is this possible?" The Lincoln Electric Company, whose sales figures have been used and whose machines are illustrated, explains that this has been brought about by constant improvement in manufacturing technique. An example was given in the processing of electrodes. The former method was to cut the wire in desired lengths and dip them in a chemical solution. Today, the electrodes are extruded with the chemical coating on the wire at a tremendous speed. This, however, is only one illustration of improved technique. Such inventive genius is the result of constant teamwork and employee-cooperation.

At an employee's suggestion, this company adopted a philosophy that "He who serves best will profit most." In addition to his regular salary, every employee shares in the company profits. In commenting on this practice, Mr. Vinson of the House Naval Affairs Committee said: "I think it is a very healthy situation to have everybody interested in a company because they feel part and parcel of that company." The fact that the average Lincoln employee has increased his annual production from $6,107 in 1931 to over $25,000 in 1941 is dramatic evidence of the merits of this philosophy.

1925



Development of a 200-amp. Welder

1915

Average hourly wage of employees, 21 cents. Selling price of welder, $1550.

1920

Total business of the company five times 1915. Average hourly wage of employees, 55 cents. Selling price of welder, $1250.

1925

Total business of the company four times 1915. Average hourly wage of employees, 57 cents. Selling price of welder, $900.

1935

Total business of the company 10½ times 1915. Average hourly wage of employees, 59 cents. Selling price of welder, $550. First bonus paid in 1934.

1940

Total business of the company 28 times 1915. Average hourly wage of employees, 84 cents. Selling price of welder, $380.

1941

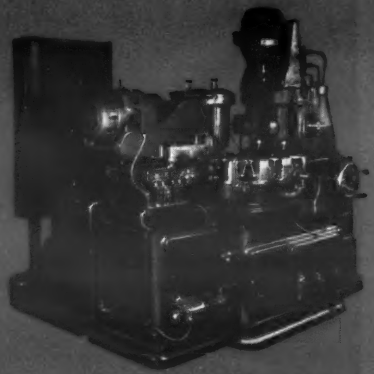
Total business of the company 50 times 1915. Average hourly wage of employees, 94 cents. Selling price of welder, $200.

1940

1941

Hydraulically operated 3-head machine for notching 75-millimeter shells.

Hydraulically operated 3-head, 6-spindle machine for 30-ton tank links, performing three milling operations simultaneously.



Vertical 7-spindle boring and facing machine for airplane crankcases.

Hydraulically operated double-end boring and facing machine, indexing type, for airplane crankcases.

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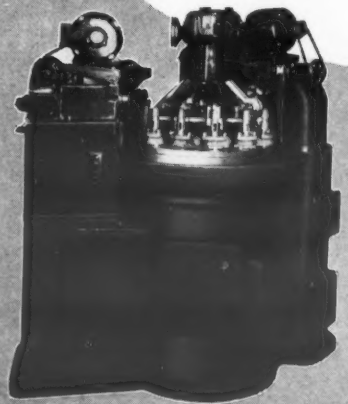
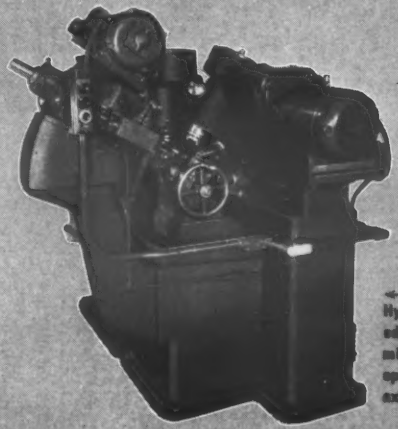
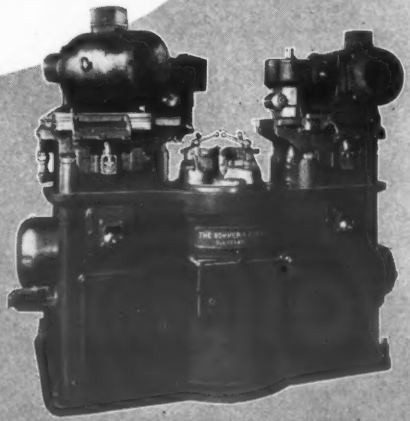


Drilling and milling machine, 12-station, indexing type, for pump bodies.



← Hydraulically operated, 2-head machine for milling and tapping operations on furrow axles.



Hydraulically operated, double-end machine for milling operations on pump bodies, 4-station, indexing type.

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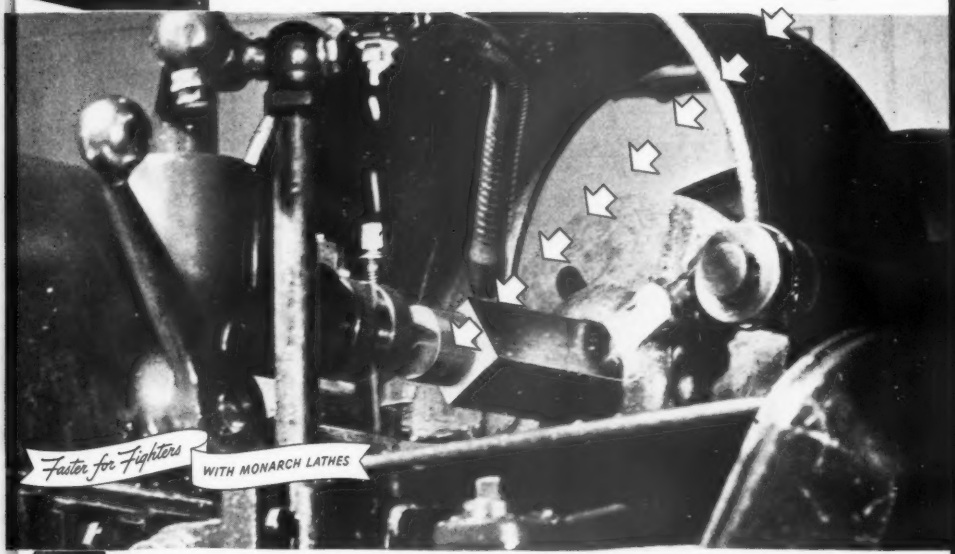

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Turning square stock with an interrupted cut puts a heavy strain on the lathe—especially at high speeds. The stud illustrated is cut from 1⅞" square stock (SAE-1020), with a Tungsten Carbide tool, at a speed of 487 RPM—creating 1948 hammer blows per minute.

But the Monarch Model W Lathe takes this work in its stride. Its design and structural strength provide the rigidity to take this interrupted pounding action. Bearings of adequate size support the main spindle and other shafts. The bearing area of the carriage on the bed, and the bearing area of the compound rest to the carriage are designed in correct proportion to provide the rigidity to stand up under such heavy punishment.

Yet the same lathe that takes, without flinching, these rough interrupted cuts performs the finest of finishing operations with unfailing accuracy.

Therein lies much of the utility of Monarch Lathes of today—which you can continue to depend upon to do your turning work—tomorrow.

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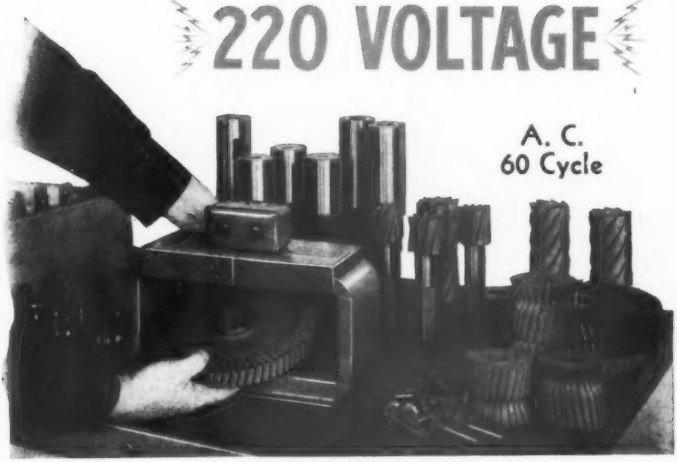

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AN outstanding unit needed wherever magnetic chucks are used. Operates on 220 voltage. Any ordinary sized pieces, such as cutters, gears, washers, etc., can be demagnetized by a single pass through its powerful field. Can be easily connected by your own electrician in any convenient location in your plant. Equipped with convenient switch. (If your power is other than 220 volt, 60 cycle, A. C., kindly let us know.) Carried in stock for immediate delivery. 10 DAYS FREE TRIAL IF DESIRED.

Price $120.00

Write for particulars

Welch INDUSTRIES, INCORPORATED

Makers of High Speed Milling Cutters — Form Tools and Special Tools

20000 WEST EIGHT MILE RD. DETROIT, MICHIGAN

DIE DESIGNING AND ESTIMATING

CONTENTS

New Chapters Added, including:

Progressive Dies

Compound Dies

Drawing Dies

(Deep drawing section on cartridge case design, mathematical and graphical methods of determining diameters, shell wall thicknesses, punch and die sizes)

Outline of Equipment and Operations for Manufacture of Small Arms Cartridge Cases

15 New Estimating Tables

Separate Index of Time Value Tables

150 Practical Points on Die Designing and Building

"WILL be extremely helpful to us . . . .", "very practical", "even better than I had hoped it would be"—these are comments by men in the precision tooling industry who have examined the new second edition of "Die Designing and Estimating". Orders for 50 copies (most on a second order after the book was reviewed) from a public library, 28 copies from an airplane manufacturer, 24 from an apprentice training instructor testify to the usefulness of this book. Largely written on request by specialists, the book covers its subject concisely, systematically and with authority.

The 160 pages have over 125 drawings, charts and photographs carefully selected to illustrate modern die designing practice. The estimating data (largely that of George Dannes) is complete enough to follow from rough sketch to a final, sound estimate.

Send for your copy today. Price $3.00 per copy plus postage. Write for quantity discounts.

AMERICAN INDUSTRIAL PUBLISHERS

338 Fairmount-Cedar Bldg. - Cleveland, Ohio

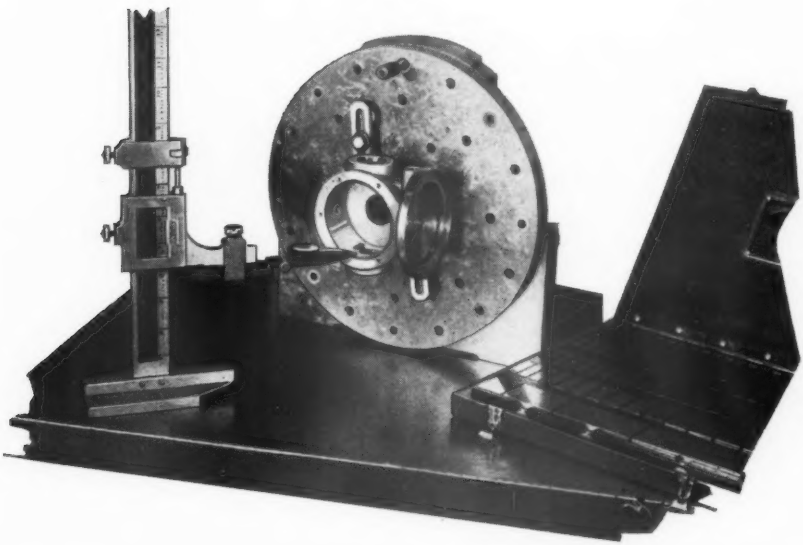
The right answer - - ALWAYS

The BECKER INDEX MASTER does not make mistakes. It is a precision unit all the way through . . . and does precision work all the way through. Whatever the part —aircraft, navy or ordnance —you can be sure that the BECKER INDEX MASTER accurately and speedily determines its conformance with drawing specifications.

Comparing the present methods used in the inspection and layout of tools and parts where a bevel protractor sine bar must be set for each dimension, you can readily see the great advantage of using the BECKER INDEX MASTER—which saves valuable time.

A new descriptive circular on the BECKER INDEX MASTER is available. Address:

THE BUNELL MACHINE & TOOL CO.
1620 E. 24th St. Cleveland, O.



AIR HAMMER *Pistons*

Air hammer piston on left is made of Graph-Tung Steel. After 5,280 hours, it showed little sign of wear. The hammer on the right, made of ordinary tool steel, failed after 546 hours.

Several years ago we made 25 air hammer pistons of Graph-Tung Steel. When one of these, operating at 2,500 strokes per minute, achieved a record of 5,280 hours of service we were so well pleased that we ran an advertisement telling all about it.

We thought then and we still think our enthusiasm was well founded because companion pistons made of standard tool steels stood up under the same service conditions a maximum of 546 hours.

Here's the sequel to this story. These 25 Graph-Tung Steel pistons averaged 7,680 hours of service life.

The less expensive Graph-Mo Steel is now being widely used with similar results.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO
Steel and Tube Division

TIMKEN
GRAPHITIC STEELS

Saw-way MULTI-PURPOSE INTERNAL GRINDER

Headstock moved back and at angle position for grinding tapered hole.

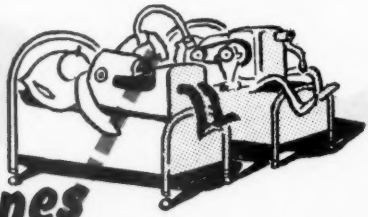
Looking down on top of machine from grinding spindle end.

Offers greater flexibility . . . a precision grinder, designed and built by engineers with years of practical experience to guide them . . . has a headstock traverse of 6″ . . . grinds holes ¼″ to 18″ in diameter . . . holes up to 9″ deep, straight or tapered . . . entire headstock may be moved at right angle to wheel traverse, by merely loosening two conveniently located nuts . . . worm compensating device permits grinding wheel head adjustment to .0001 . . . sturdy construction throughout . . . full specifications, delivery time and price on request.

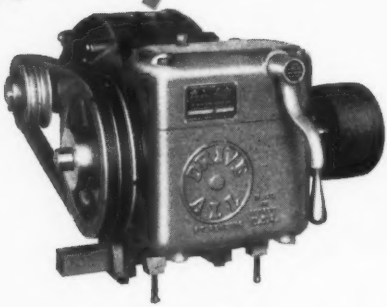
Distributors throughout the U. S. and Canada to serve you.

Saw-way TOOL AND MACHINING CO.

13836 JOS. CAMPAU AVE. DETROIT, MICHIGAN



Give those Veteran Machines A BLOOD TRANSFUSION!



INDIVIDUAL DRIVE WILL STEP UP THE EFFICIENCY OF THE OLDER MACHINE TOOLS IN YOUR SHOP

Choose Wisely — Choose DRIVE-ALL

DRIVE-ALL offers you the steady, smooth, flexible power transmission called for by precision tools. Ruggedly built, superbly engineered — DRIVE-ALL is the answer to every machine tool motorizing problem. Installation time has been pared to the minimum by DRIVE-ALL standardized mounting units which permit quick adaptation to any machine. Available with 3- or 4-speed transmissions for use on both small and large machines. Clutch model also available. You can get prompt shipment.

Mail the coupon at the right for catalog and data.

DRIVE-ALL

MANUFACTURING COMPANY

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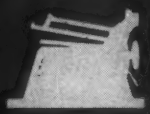
DRIVE-ALL

DRILL PRESSES AND RADIALS

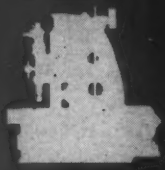
SHAPERS AND PLANERS

MILLING MACHINES



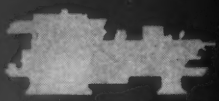
SPECIAL APPLICATIONS

AUTOMATICS AND TAPPERS



BORING MILLS

GEAR CUTTERS



LATHES AND TURRET LATHES

DRIVE-ALL
MANUFACTURING CO.
3400 Conner Avenue
Detroit • Michigan

Tell me more about motorizing:

Kind of Machine	Maker	Size	Speeds High	Speeds Low

Name_____

Company_____

Street_____

City_____ State_____

Metallurgical "Lab" Feature of New DoAll Factory

IN line with government policy calling for de-centralization of industry, the Savage Tool Co., formerly of Minneapolis, announces the removal of its plant and offices to Savage, Minnesota.

The new plant, erected by this company, is 85 feet by 225 feet. Glass has been extensively used throughout to provide the maximum of natural light. The site on which the plant is located provides for trackage from three railroads, as well as river transportation.

An interesting feature of the new factory is the completely equipped metallurgical laboratory, to permit thorough inspection and analysis of all materials entering into the company's products.

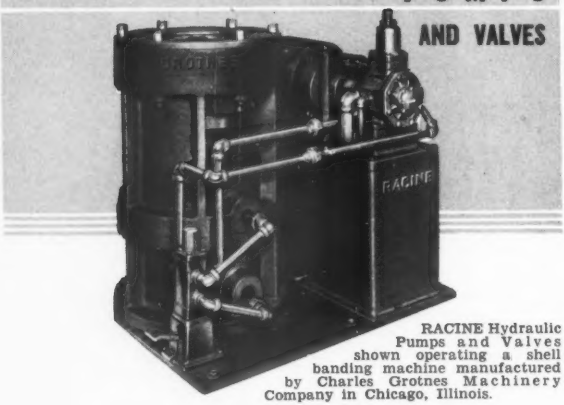
For the past two years, Savage Tool Co. has produced the DOALL Surface Grinder which, in even this comparatively short time, has earned an enviable reputation in the machine tool field for its accuracy and ability to produce under the trying demands of the war effort. Savage Tool Co. has centered its manufacturing efforts on this one type of machine tool, realizing that out-moded surface grinding equipment, which was designed for the comparatively large tolerances of a few years ago, could not be expected to cope with demands for accuracy down to one or two ten-thousandths of an inch, and with surface finishes designated in micro-inches.

DOALL Grinders feature extremely heavy base construction for better absorption of vibration. They are completely hydraulic in operation and incorporate a spindle arrangement that has become known as one of the best engineered units of its kind yet produced.

Savage Tool will soon announce a product of which it is justifiably proud. The amazing accuracy of grinding found possible on DOALL Grinders prompted this firm to enter the gage block field. One of the most urgent demands in war industry has been for gage blocks from which to set standards of accuracy. These blocks are accurate to within a very few millionths of an inch.

(Cont'd on Page 133)

RACINE HYDRAULIC PUMPS AND VALVES



RACINE Hydraulic Pumps and Valves shown operating a shell banding machine manufactured by Charles Grotnes Machinery Company in Chicago, Illinois.

NOW IS THE TIME — 1942

PRODUCTION must be speeded up—operations simplified, machines ever more productive. With RACINE smooth—directly applied—hydraulic power you efficiently increase your output and eliminate complicated mechanisms which wear—get out of adjustment—consume time.

RACINE offers a proven and tested line of variable volume hydraulic pumps and balanced piston type hydraulic valves and controls. To speed your production in munitions . . . die casting . . . plastic moulding . . . metal forming . . . pressing . . . coining and in many other operations. Write now for our new catalog or better still—make free use of our engineering experience to help solve your problems.

RACINE TOOL AND MACHINE COMPANY
1768 STATE ST., RACINE, WISCONSIN

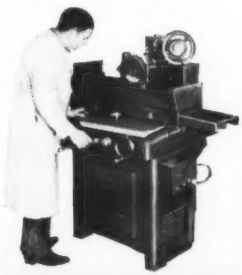
● In war production plants everywhere, the DoAll is doing an outstanding grinding job on three counts — speed, smoothness and extreme accuracy.

The above view taken in an Ohio plant shows a production set-up of 50-caliber bullet dies, one of many difficult jobs handled on the DoAll.

Special ultra-modern construction features have minimized vibration, and insure long, satisfactory, high precision service.

6 REASONS WHY THIS GRINDER IS THE BEST

EXTRA WEIGHT
OVER ONE TON
EXTRA BEARING AREA
827 Sq. In. of Bearings HAND SCRAPED
DIRECT DRIVE
• • BALL BEARINGS IN SPINDLE ARE SUPER ACCURATE
MASSIVE COLUMN
POWER HEAD RESTS ON A PILLAR OF STRENGTH
PROTECTIVE SADDLE
MECHANISM IS FULLY SEALED
NEW HYDRAULIC DRIVE



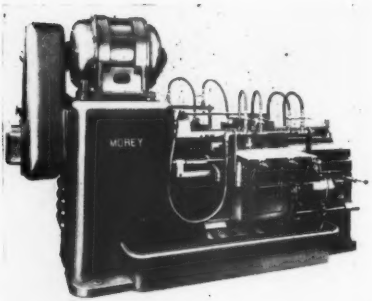
WORTH LOOKING INTO

Send for interesting literature about this better grinder.

SAVAGE TOOL CO.

Dept. TD, Savage, Minn.

Many Turning Operations Performed with Morey Lathe



WHILE the Morey "27" Semi-Automatic Lathe embodies all the features of a single purpose machine for simplicity of design and operation, it is not a single purpose machine.

The headstock is capable of transmitting to the work all the power that motors up to 100 hp can deliver. A straight line drive from the motor through a twin disc clutch, spiral pick-off gears and herringbone pinion to the final drive, provides the necessary speeds for most efficient operation.

The front carriage rests entirely on the front ways of the bed, top and bottom. There is no carriage bridge to interfere with the free flow of chips and cutting oil. It can be equipped with 1 to 6 toolholders.

The feeding mechanism consists of a single hydraulic cylinder mounted on the front of the machine for longitudinal feeding; two cylinders built into the saddle for bringing the tools to the required depth of cut and for returning the tools to the idling position.

The lathe is designed so that the bed has large openings for chip clearance and has provision for a conveyor system to remove turnings as quickly as they are produced.

Morey Machinery Co., Inc., 414 Broome St., New York, N. Y., will send additional information. Ask for Circular No. 715.

Full Hardened—then Drilled at Assembly

4 Countersunk 1/2" Holes in 12 Minutes in Hardened Work Spindle for Threadmill.

● Any drill press operator can drill, countersink and counterbore hardened steels with "HARDSTEEL" drills and produce accurate, smooth holes quickly and with an ease that will amaze you.

No annealing—no grinding—no rehardening—no distortion. A boon to die makers—a production tool that is changing shop practice in hundreds of plants.

Used with standard drill presses and jigs. Easy to regrind. Sizes 1/8" to 1" from stock. Special sizes to order.

HARDSTEEL DRILLS

You harden it—we'll drill it—with "HARDSTEEL"

The "HARDSTEEL" Instruction Handbook tells how. Write for a copy—

BLACK DRILL CO., 5005 EUCLID AVE., CLEVELAND, OHIO

REAMERS • TOOL BITS

Peerless Saws are Helping to Save—TIME..METAL..and BLADES

American tools and free Americans have created a miracle of mass war production . . . have set an impossible pace for Axis slaves to follow. To help these free men produce, Peerless has made practical the faster cutting of metal.

PEERLESS 14" High Duty Saw, cutting butt end from 155 mm semi-finished shells. As many as 800 pieces are cut with a single, high-speed, 4 tooth, $1.50 blade.

Faster cutting has been made practical with a Peerless — the Saw with the exclusive Four-Sided Saw-Frame, and Backing-Plate Blade Support. Besides reducing CUTTING TIME; Peerless Saws save METAL, too. The thin, cool-running, straight-cutting blade removes as little as 1/16" of the stock.

BLADE SAVINGS also count up fast in triple-shift, high speed cutting. On a Peerless High Duty as many as 800 butt-end shell cuts are being made with a single blade.

These savings in TIME . . . METAL . . . and BLADES are helping free men to win, and to buy their War Bonds every pay day. More complete details on this 3-way saving will be mailed at your request.

PEERLESS MACHINE COMPANY • RACINE, WISCONSIN

Peerless
METAL SAWING MACHINES

PEERLESS MACHINE COMPANY
Dept. TDJ-742, Racine, Wisconsin
Mail catalogs on Metal Sawing Machines.

Company.....

Individual.....

Street.....

City.....State.....

FAST, ACCURATE CUTTING DEMANDS POSITIVE BLADE CONTROL

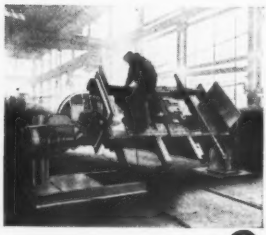
Rapid Production to Close Tolerances

A NEW bench model turret lathe for rapid production to closer tolerances on chucking operations or bar work has just been announced by the South Bend Lathe Works. This lathe has a 10" swing over the bed and saddle wings, 1⅜" hole through the headstock spindle and 1" collet capacity. It is well adapted to second operation work.

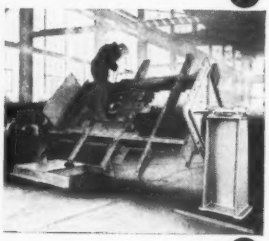
The handlever operated bed turret indexes automatically and has an adjustable stop for each of the six turret faces. The lathe is equipped with both a compound rest cross slide and a handlever cross slide, which are interchangeable. The latter is furnished with front and rear tool blocks which provide three tool positions. A quick change gear box supplies 48 longitudinal power feeds for the universal carriage, 48 power cross feeds for the compound rest cross slide and 48 thread cutting feeds, 4 to 224 per inch. The underneath motor drive and back gears deliver twelve spindle speeds from 97 to 700 rpm.

A large assortment of attachments and accessories simplify tooling for specialized work or second operation jobs. For information write to South Bend Lathe Works, Dept. 198, South Bend, Ind.

TURNING A WELDMENT FOR BETTER, FASTER, DOWN-HAND WELDING



A



B

Cullen-Friestedt Positioners equipped with a "tailstock," (a free-turning platen mounted on a suitable stand) permits a complete rotation of heavy awkward weldments so that faster, better down-hand welding may be done. "A" shows positioner end of this set-up and "B" the other end showing the tailstock. With push-button switch, the welder has complete control of turning speed and starting and stopping at convenient welding positions.

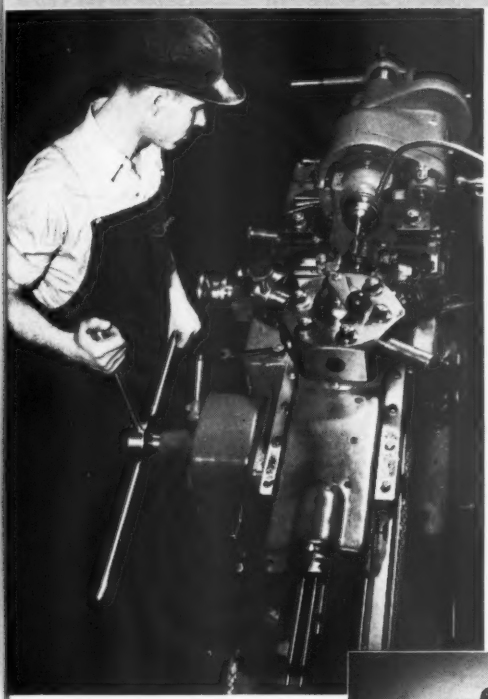
● Our NEW booklet WP 21 is just off the press giving full information about C-F Positioners in four sizes from 1200 to 14,000 lbs., capacity. Write for it.

CULLEN-FRIESTEDT CO.,
1316 S. KILBOURN AVE. CHICAGO, ILLINOIS

Pyle Appointed

THE McKenna Metals Co., Latrobe, Pa., announces the appointment of Robert H. Pyle as Southern Indiana Representative. Mr. Pyle has had a long experience in metal cutting tool engineering, especially with modern cemented carbide steel-cutting tools.

Production Plus Precision



Modern in design, built with extreme precision, South Bend Turret Lathes are fast—accurate—versatile. They have the speed, power and rigidity for efficient quantity production of duplicate parts without sacrificing the precision accuracy or high quality finish usually considered possible only on small lots.

Features responsible for the outstanding performance of this new turret lathe, even on second operation work, include exceptionally rigid turret and carriage construction, a quick change gear box providing a wide range of power feeds for the universal carriage and the turret, complete thread cutting range through lead screw and half-nuts, and a wide range of spindle speeds.

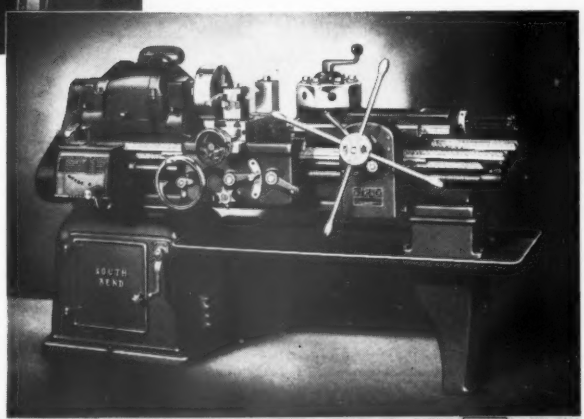
SPECIFICATIONS

No. 2-H South Bend Turret Lathe

Hole through spindle . . . . . 1⅜″
Maximum collect capacity, round . . . 1″
Swing over bed and saddle wings . . 16¼″
Spindle speeds, twelve . 16 to 880 R.P.M.
Effective feed of turret slide . . . . 6⅛″
Distance from spindle nose to turret . 30½″

Navy "E" for Excellence

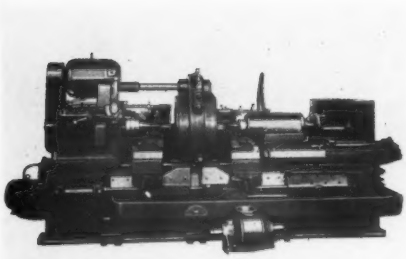
Awarded to the South Bend Lathe Works for outstanding performance in the production of ordnance matériel for the United States Navy.



SOUTH BEND LATHE WORKS

Dept. 198 South Bend, Indiana *Lathe Builders For 35 Years*

Single Power Unit Operates All Feeds



A PRODUCTION increase of 65% is possible with this heavy-duty, double-end hydraulic machine.

An interesting feature is the hydraulic feed operated from a single hydraulic power unit in the rear of the machine. This unit furnishes power to both front and rear tool slides as well as to the tailstock. The movement of the tailstock is controlled by a hand operated valve and facilitates loading and unloading by pushing the piece forward into the center drive fixture.

The right hand tool bracket, when swung into clearance position, provides a loading platform in line with the locating surface in the center drive.

When the part is loaded and pushed into place between centers, it is damped manually and the tailstock locked in place, ready for the first of the two turning operations.

A further function of the hydraulic system is the actuating of the front and rear tool slides. A single cylinder is used to cam the two front slides into position, at which point the cams stop moving and the tool slides are traveled through their work cycle.

Each front tool slide has its own hydraulic cylinder and the slides are racked together to permit a single hydraulic and electrical control.

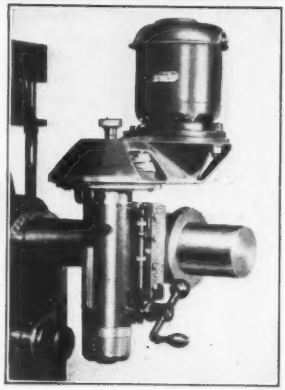
Complete information furnished by Snyder Tool & Engineering Co., Dept. TJ., Detroit, Mich.

HALCO

Universal Head

Speed Accuracy Dependability

FOR HIGH SPEED MILLING, DRILLING, BORING AND COUNTER BORING ON ANGLE WAY



Motor of heavy duty type, ½ H.P., 110 volts, 60 cycle, with plug-in cord and switch. Easily reversible for L. H. cutters. Five speeds 350 to 2900 R. P. M. Also 10 speeds 125 to 2900 R.P.M. available at extra cost.

PROMPT DELIVERIES

Over 500 Now in Use

THE Halco Hi-Speed Universal Milling attachment is designed to meet the demand for greater efficiency, better workmanship, and for speed in building tools, dies, jigs, fixtures, wood and metal patterns, and other machine products where accurate and fast machining is of prime importance.

With its 4 inch vertical travel, many drilling, milling, boring and facing operations can be accomplished in one setup. The total weight is approximately 90 pounds, and it can be easily mounted by one man.

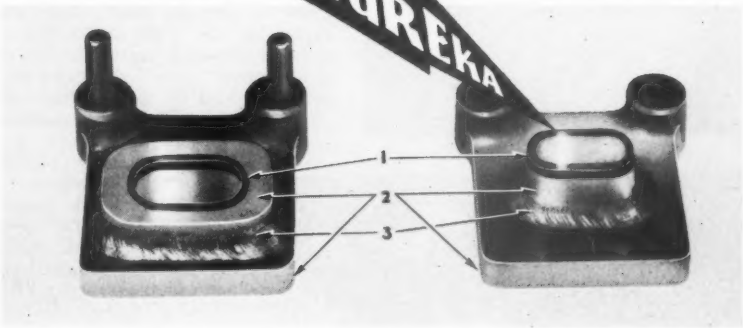
Write for folder giving details or order now for quick delivery.

HALCO PRODUCTS CO.

14231 Birwood - Detroit, Mich.

Here's an Opportunity..

to CONSERVE TOOL STEEL by using EUREKA ELECTRODES



Yes—it's being done every day. Tons of tool steel and alloys are being saved by welding worn or fractured dies with Eureka Electrodes and the use of a vast amount of like material is being eliminated by welding on the working edges of less expensive and more easily procurable carbon steels.

HERE'S HOW IT'S DONE

Illustration shows typical fabricated dies. Arrows 1 point out tool steel electrode deposits used as cutting edges, neither of which are over 3/16 inch thick. Arrows 2 indicate machine steel used instead of tool steel to lower die composition cost, and 3 refers to construction welds made of mild steel rod to hold die parts together.

We would like you to have our bulletin which describes and illustrates in detail the application of this new type of electrode. Send for it now!

WELDING EQUIPMENT and SUPPLY COMPANY

226 LIEB STREET **DETROIT, MICH.**

Grinder has Pantograph Optical Checking Instrument

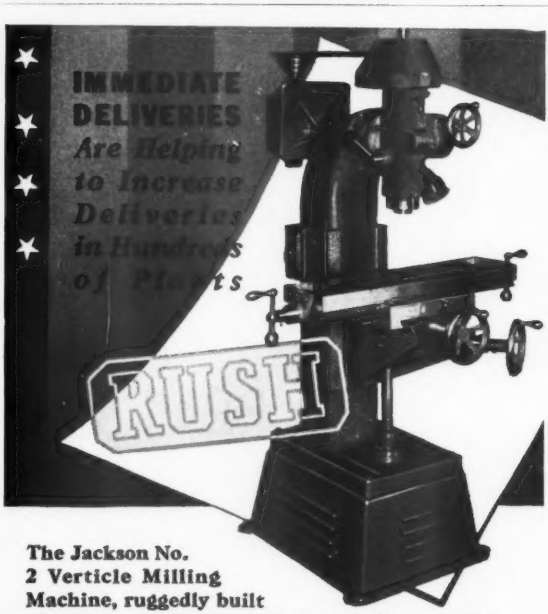
THE Wickman Optical Form Grinder will finish grind to a high degree of accuracy any flat or circular form tools, punches and dies, profile gages, templates and many other regularly or irregularly shaped parts.

Actually, the machine is a combination of a full universal tool grinder with a pantograph controlled optical checking instrument. The grinding head carries a wheel slide which moves up and down at 80 strokes a minute across the contour of the part to be ground. The work is clamped to the table and its position controlled and set by compound slides.

Preliminary to the grinding operation, a 50:1 layout is prepared in the drafting room on any paper of non-deforming quality. It is fastened to the layout plat located above the machine. In conjunction with the layout plat is a 50:1 pantograph. A 30 power microscope is carried on the short arm. The long arm of the pantograph carries a pointer which the operator moves from point to point along the line of the layout. The microscope is arranged with rotating cross hairs the intersection of which corresponds to the position of the pointer on the long pantograph arm.

As the operator moves the pantograph pointer, the intersection of the cross hairs moves correspondingly at the 50:1 reduction. The wheel head assembly can be adjusted to any desired position or angle.

(Cont'd on next Page)



The Jackson No. 2 Verticle Milling Machine, ruggedly built of quality materials, will prove indispensable for Tool Room or Production applications. 5 speed V-belt drive, sturdy 4¼″ quill and ¾″ spindle capacity 8″ x 32″ table.

JACKSON
MACHINE & TOOL COMPANY SALES DIVISION
956 Roberts St. Jackson, Michigan

Multiple Angle Drill Speeds Position Changes

THE Cleveland Pneumatic Tool Co. reports that large-scale production of the new Multiple Angle Drill is now ready to proceed.

This light, rotary drill features a drilling head which can be set at any angle through 360°. One tool thus effectually fulfills the function of many angle drills. The head swivels in two planes. Besides the facility with which it can be set for drilling at any angle, it can also be turned to any position relative to the location of the throttle lever. The design permits the fingers of the operator's hand to be brought close to the point of application, increasing the accuracy of handling the drill and insuring more speed in changing from one position to another.

This multiple drill weighs 2½ lbs., and is about 8" long when set for drilling in the direction parallel to the center line. The speed of the No. 9D010 is 1000 rpm and of the No. 9D020, 2000 rpm.

The Cleveland Pneumatic Tool Co., 3738 E. 78th St., Cleveland, O., will send an illustrated bulletin on request.

(Cont'd from Page 80)

As the work is being viewed and inspected directly in the operating plane, the wheel is always fed up to the determined point on the work. The accuracy of the grinding operation is, therefore, not affected by wheel wear.

The 2" stroke of the wheel permits a number of thin pieces to be stacked together. This feature is particularly valuable when producing small quantities of precision parts which must be identical.

Further details will be furnished by the Wickman Corp., 15533 Woodrow Wilson Ave., Detroit, Mich.

Eliminates Some Costly Tools

Case History No. 4

The adapters are clamped on a "V" block which in turn is mounted on a rotating table on a milling machine. A slotting tool, ground to the exact dimension specified, is fastened to the clapper box tool holder . . . Each spline is cut in a few minutes — after rotating to a new position — the operation is repeated until all of the splines are cut accurately, dimensioned and equally spaced . . . Broaching — the only alternative — would have involved the expense of a series of broaches and broaching operations because the splines stop at the shoulder of the adapter . . . Use of the SLOTMASTER required no tooling expense and only one set-up.

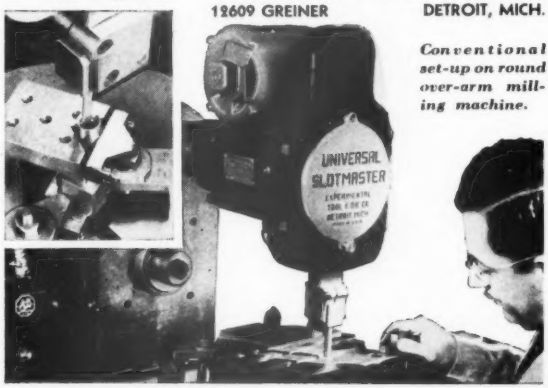
SLOTMASTER can be used on milling machines and provides double duty, etc.

SLOTMASTER can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other . . . The stroke of the ram is adjustable from 0 to 4" . . . the speeds range from 50 to 250 s. p. m. . . . The tool holder, of the clapper box type, can be turned in any position . . . All of the working parts are of tool steel heat treated and ground to close tolerances . . . SLOTMASTER comes complete with pulleys, motor, belt and mounting adaptable to round over-arm or flat-on-round over-arm milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip. Immediate deliveries on high priorities.

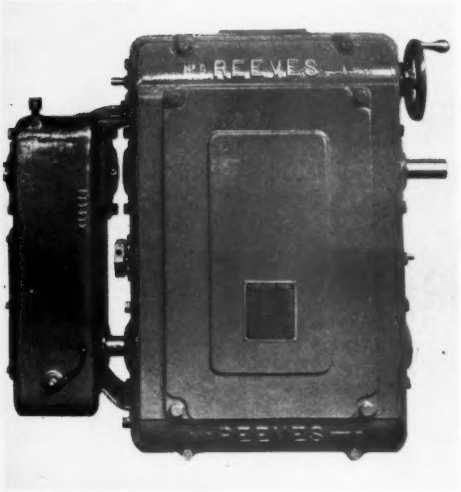
EXPERIMENTAL TOOL & DIE CO.

12609 GREINER DETROIT, MICH.

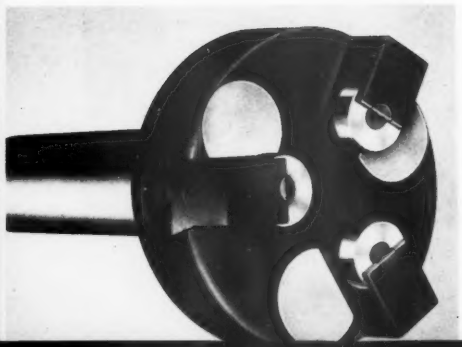


Conventional set-up on round over-arm milling machine.

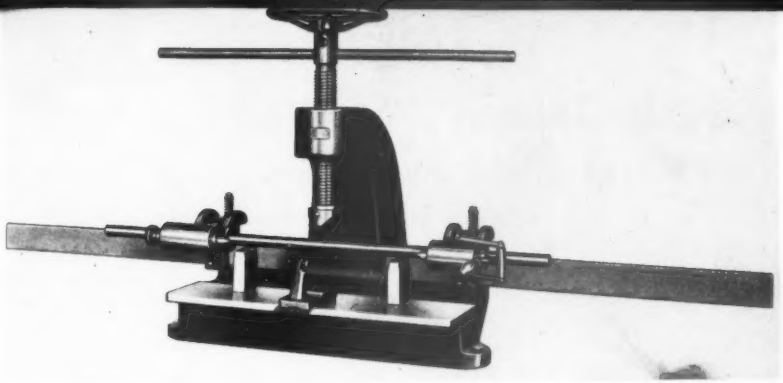
Progress on Parade



REEVES Pulley Co., Dept. 7, Columbus, Ind., now offers an enclosed design Reeves Variable Speed Transmission. It is equipped with a built-in chain reducer and it has the output shaft in exact alignment with the input shaft. Output speeds may be either increased or decreased as compared to the variable speed shaft of the transmission by turning the speed control handwheel.



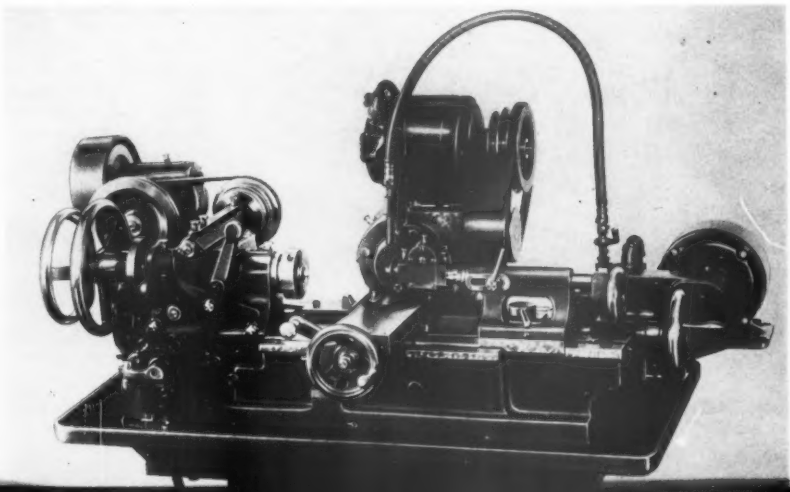
A NEW addition to the Boyar-Schultz line of tools for screw machines. It is an ideal tool for use where a surface smoother than the usual machined surface is required and in many instances eliminates an extra operation. Sturdiness and simplicity make this Burnishing Tool easy to adjust, long lasting and efficient to operate. Write Boyar-Schultz Corp., 2112-G Walnut St., Chicago, Ill., for circular.



HERE is a big improvement in hand operated straightening presses. It is powerful, fast, easy to operate, rugged and simple. Ideal for the heat treating shop or tool room—in fact, wherever straightening is to be done upon a wide variety of parts. The Lock Lever Center Type Shaft Straightening Attachment is also shown. Manufactured by General Mfg. Co., Dept. 5, Detroit, Mich.

THE illustration shows the latest in a line of over 300 styles of rotary burs, files and rasps. It is a mill cut bur with cross-cut teeth to give a good cutting edge at the point. This bur can be resharpened at a fraction of the original cost. Additional details are contained in a new 12-page bulletin which is available by writing The Martindale Electric Co., 1417 Hird Ave., Cleveland, O.

THE Waltham Thread Miller is especially suitable for small work which, therefore, makes it of considerable interest to industries that have relatively small pieces to accurately thread. Various attachments increasing the usefulness of the machine are available. A new bulletin may be obtained by writing Waltham Machine Works, Dept. T-4, Waltham, Mass.



Wet Grinding Efficiency Increased by New Wheel Guards

A NEW scientifically designed wheel guard on Hammond's new Models 10 and 14 Carbide Tool Grinders has just been announced.

The guards and coolant flow control keep the operator and floor dry during wet grinding operation. The guards are concealed and are close to the wheels, thus the maximum amount of light and fullest operating freedom is provided the operator. Each Guard is easily rotated from one side of the wheel to the other by a handle, quickly accessible.

The hood (which encloses the Guards) and the table mechanism are protected from dust and grit. This integral unit is mounted on enclosed shaftways and is moved in or out from the wheel by a convenient crank. This provides quick means of adjustment for wheel wear and wheel changes. The hood is easily removed by two conveniently located socket head cap screws on either side of the hood section.

The tables are mechanically controlled by a crank and worm tilting mechanism adjustable to any point between 15° above and 30° below horizontal.

Either model is available for wet or dry grinding.

For complete data write Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo, Mich. Ask for Bulletin No. CP-14.

FLATNESS and SMOOTHNESS
of Production Parts
The Ultra-Lap machine will finish your parts to a flatness of one light band or less . . . to a smoothness as low as one micro-inch R.M.S., any metal or material. Much faster, more uniform than hand method. Machine designed for you or we shall be pleased to lap your parts on a job basis. Ultra-Lap machines and service used by aircraft and many other war-time industries.
Ultra-Lap MACHINE COMPANY
245 McDOUGALL AVE. • DETROIT, MICH.

Small Muffle Furnace Meets Production Demands

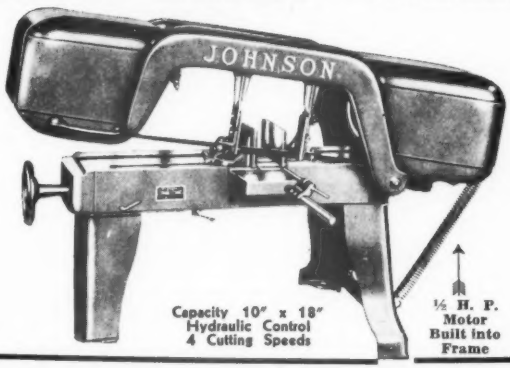
DUE to the excessive demands placed upon commercial heat treating plants, it has become increasingly difficult for small tool and die shops and other manufacturers lacking heat treating furnaces to secure this important service. To offset this disadvantage, the Cooley Electric Mfg. Corp., builder of laboratory and heat treating furnaces, has developed a small electric muffle furnace in two sizes. This unit, for small parts, is for economical and fast heat treating, drawing or tempering, normalizing or annealing, pre-heating for subsequent high-speed hardening and for emergency repair orders where one or two small parts must be heat treated in a short time. It can also be used as auxiliary equipment to larger furnaces.

The construction of this furnace closely follows that of the Cooley Laboratory Muffle Furnace, for many years standard apparatus for laboratory equipment. Heating characteristics have been changed to meet industrial needs but all other specifications have been maintained.

The furnace is simple in structure, the outer shell being of heavy gage sheet steel interposed between cast iron and frames secured by through rods. Elements are of the embedded type which afford protection to the element wire from atmospheric attack.

Additional information can be secured by writing Cooley Electric Mfg. Corp., Dept. TJ, Indianapolis, Ind.

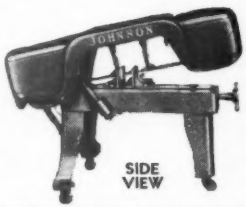
METAL SAWING—*Streamlined*



JOHNSON METAL CUT-OFF BAND SAW

SPEED ACCURACY EFFICIENCY

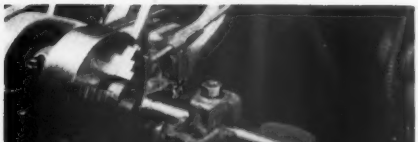
Plant production men working on "impossible" completion schedules know and appreciate the Johnson Saw. Set-ups require only a minute or two, cutting action is fast and continuous. Unlimited adaptability and flexibility for handling almost all kinds of cutting. 3-point base makes special flooring unnecessary.



JOHNSON MANUFACTURING CORPORATION
ALBION MICHIGAN

Write today for descriptive folder to:
Sales Office: 5000-04 CHRYSLER BUILDING, NEW YORK

Add Hours of Production to Every Shift



CLAYTON Boring Bar Holders save time and add hours of production to every shift by cutting downtime to a minimum. Through this savings in downtime, it is claimed, more man and machine hours are available; output is increased and costs are reduced.

An exclusive dual clamping arrangement permits independent adjustment of the bar or alignment of the holder. The boring bar holder can be removed from the lathe without affecting the boring bar setting. Bars, on the other hand, can be changed, tool bits raised or lowered, distances lengthened or shortened between the tool bit and the body of the holder —all without disturbing the alignment of the holder with the lathe.

Clayton Boring Bars offer many features not obtainable in other bars. They are made from special tough non-chattering steel and are permanently graduated in ¼" calibrations to speed production by indicating the depth of bore. This feature eliminates the necessity for file and chalk marks. Tool bit holes are accurately broached and bits are firmly held by Allen set screws to eliminate movement.

These boring bars and boring bar holders are made in six sizes for 9" to 36" lathes.

For complete information address the Clayton Mfg. Co., Dept. 7, Alhambra, Calif.

METAL TREATING INSTITUTE

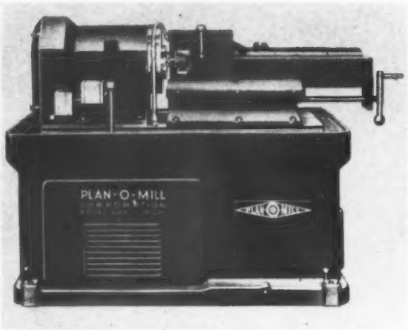
Flame Hardening · Annealing · Aerocasing
Bar Stock Treating and Straightening
Heat Treating · Pack or Gas Carburizing
Sand Blasting · Chapmanizing · Tempering
Cyaniding · Nitriding · Hi-Speed Hardening

THE LAKESIDE STEEL IMPROVEMENT CO.
5418 Lakeside Avenue CLEVELAND, OHIO Phone Henderson 9100

Irregular Shaped Parts Accurately Milled on the Plan-O-Mill

THE Plan-O-Mill Corp. announces a further improvement—the use of a Thy-mo-trol feed control—built in its standard planetary milling machine.

Thy-mo-trol is a new development of the General Electric laboratories and its use as standard equipment on the Plan-O-Mill is believed to be an innovation. Converting alternating current into direct current, Thy-mo-trol provides an infinite range of feed, both into and around the work, by regulating the flow of current to the feed motor. Changing gears and sheaves is unnecessary.



The new Plan-O-Mill development is designed to promote maximum production consistent with maximum cutter life. Parts too cumbersome or irregular in shape for the conventional milling machine are milled speedily and accurately on the Plan-O-Mill. The part does not move, since all motion is in the milling head. On even the largest job the time required to reverse the cutter and return it to center is reduced to 15 seconds or less.

Plan-O-Mill Model 3 is designed and widely used for internal and external, right or left hand, threading and form milling where rapid production, precision and high finish are required. It is also suited to many types of form milling.

The Plan-O-Mill Corp., Dept. T, Royal Oak, Mich., will send additional information.

SPEEDING up production through use of simple jig which holds tubular framework during welding operation.

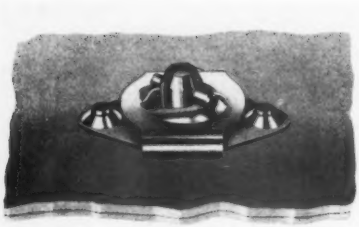
ALL SIZES ALL TYPES

DE-STA-CO Toggle CLAMPS assure quick, positive clamping and easy, instant release. When you design fixtures for holding parts during welding, machining, reaming, inspection, drilling, assembly or similar operations always specify De-Sta-Co Toggle Clamps . . . built in all sizes from the small 9¼ ounce aircraft model up . . . every clamp carefully engineered to assure ease of operation without undue looseness.

Bulletin No. 41 illustrates many uses . . . sent free, on request.

DETROIT STAMPING CO.
Established Over 25 Years
344 Midland Ave • Detroit, Mich.

New Shakeproof Cowl Fastener Answers Aircraft Need



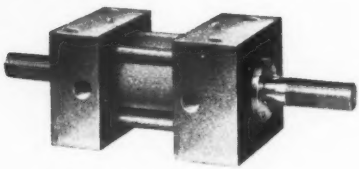
TO answer the need of aircraft manufacturers for a quicker, more secure and trouble-free method of attaching cowling and other removable parts, an efficient cowl fastener of simplified design has been introduced.

A standard Shakeproof Cowl Fastener assembly consists of three parts—main spring, stud and cross pin. To install this fastener the main spring is riveted in place over a drilled or punched clearance hole in the inner surface sheet. The stud member is inserted in a matching clearance hole in the outer sheet and the cross pin is then press-fitted in the stud with special pliers. Upon closure of the cowling or removable part the stud member and main spring quickly come into alignment position. A clockwise quarter turn locks the stud and pulls the parts together with a powerful dual spring tension.

The Shakeproof Cowl Fastener, it is claimed, reinforces rather than weakens the adjacent structural area and presents no stress hazards. It is compact in size, light in weight and provision has been made for the addition, without special tooling, of optional accessories.

Engineers, buyers and production men may obtain copies of new 28-page Catalog 409 from Aviation Division of Shakeproof Inc., 2501 N. Keeler Ave., Chicago, Ill. Address requests on company letterhead.

on (T·J) HYDRAULIC CYLINDERS



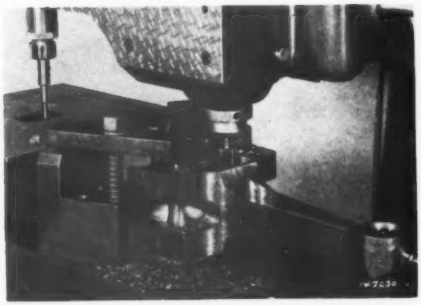
- **The mounting surfaces are parallel with (or at right angles to) the bore of the cylinder.**
- **All surfaces are as square and as smooth as is warranted.**
- **All mounting holes are drilled—not just cored.**

This workmanship makes for better installation, admirable appearance on the job and what is better yet, of course, insures a longer life of more efficient performance. Catalog H-40 sent promptly on receipt of your request.

this is a TOMKINS-JOHNSON *product*

630 North Mechanic Street Jackson, Michigan

Profile Machining Now Possible With Standard Machine Tools



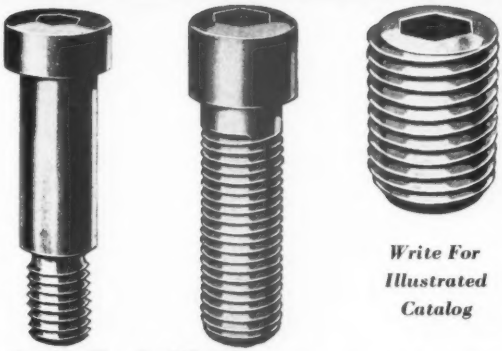
THE Duplimatic is a semi-automatic control that permits profile machining with standard machine tools at speeds and accuracies considerably beyond the capacity of human operation. This equipment controls both the transverse and longitudinal feeds of a vertical milling machine in much the same manner as would an operator using manual control alone. Manipulation of feed screws by the Duplimatic control is in accordance with the outline of a template which is mounted on the table with the work. Thus, the cutting tool mills along a path identical with the template in the same manner as that controlled by an operator—except at greater speeds and closer accuracies.

The work, as shown mounted in the illustration, has a template fastened to the table beside it. A tracer mechanism is mounted on the head of the mill and remains immovable as does the cutting tool.

The sensitivity of this touch is so exact that the instant the movement begins to reduce or increase the pressure between the template and tracer finger, the Duplimatic instantly reverses the travel and re-establishes the proper contact. The tracer arm can easily be removed if necessary and the portable control mechanism can be placed where it is readily available to the operator.

Further details will be furnished by Detroit Universal Duplicator Co., 257 St. Aubin Ave., Detroit, Mich.

We deliver the goods!



Write For Illustrated Catalog

SCREWS IN STOCK FOR IMMEDIATE SHIPMENT

● **Yes, sir . . . we carry them *in stock* for prompt delivery! Socket Screws, heat treated or common Hexagon Head Cap Screws, Hexagon Nuts, Flat and Lock Washers.**

We can fill your requirements for all Die Maker's supplies, including a complete line of Springs in three standard types, and the amazing Hardsteel Drills that enable you to drill hardened steel without annealing.

DIE SUPPLY COMPANY

J. R. Fitzsimmons W. H. Fitzsimmons Jos. T. Fitzsimmons

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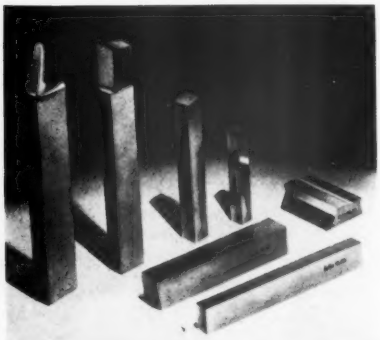
1390 East 30th St. Cleveland, O.



Stellite Tools for Machining Operations

STELLITE 98M2 tools are made of a new cobalt-chromium-tungsten alloy especially designed to increase the speed of machining steel in production shops.

Production tests on many types of steel have resulted in Stellite tools being adopted on a large variety of machining operations on steel parts important in the War Program. With 98M2 tools, heavy roughing cuts are being taken on steel turning jobs with coarse feeds—to get high rates of metal removal—yet tool life is long and economical, for the new alloy is well balanced in red hardness, edge strength, and toughness.

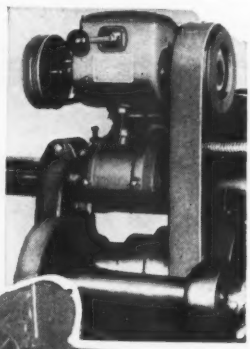
Stellite 98M2 tools are making big increases in the production of shell, aviation, gun and tank parts; armor plate, and many other items vital to the War effort. Specific operations include turning, facing, boring, reaming, milling, grooving, cutting-off, forming, spot facing, core drilling, and counter-boring.

Where heavy feeds and high speeds are used for the fast removal of metal on production operations, Stellite 98M2 tools have been, in many instances, adopted as standard because of their high cutting quality and strength, and because they are not subject to excessive breakage.

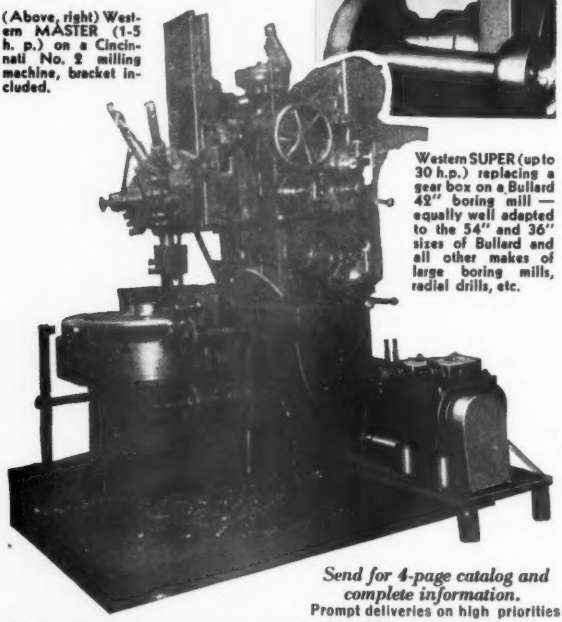
Further information about Stellite 98M2 steel cutting tools can be obtained from Haynes Stellite Co., Dept. TJ, Kokomo, Ind.

WESTERN 1-30 h. p. TRANSMISSIONS

A MASTER (capacity 1-5 h. p.), a MAJOR (capacity 5-10 h. p.) and a SUPER (up to 30 h.p.) can be installed on lathes, milling machines, shapers, radials, slotters, boring mills, gear cutters, die sinkers, etc.



(Above, right) Western MASTER (1-5 h. p.) on a Cincinnati No. 2 milling machine, bracket included.



Western SUPER (up to 30 h.p.) replacing a gear box on a Bullard 42" boring mill — equally well adapted to the 54" and 36" sizes of Bullard and all other makes of large boring mills, radial drills, etc.

Send for 4-page catalog and complete information.

Prompt deliveries on high priorities

WESTERN MANUFACTURING CO.

3414 Scotten Ave. Detroit, Mich.

Balanced Design Eliminates "Pressure Locking"

STRENUOUS and tiring valve-lever manipulation and a tendency toward "pressure locking" have long been troublesome obstacles to users of hydraulic power at pressures of 1,000 lbs. or more. A new type of high pressure hydraulic operating valve, which overcomes these obstacles, has been announced.

Because the hydraulic pressure inside of this new type is always *balanced*, it can never become "pressure locked." The lever is just as easy to operate from "on" position as from "neutral". As a result, this valve greatly steps up the productivity of high pressure hydraulic machinery and eliminates undue fatigue on the part of the operator even when the valve is manipulated rapidly for hours at a time.

This new balanced valve has only one moving part. This fact, together with its simplified design, makes it practically wearproof and does away with nearly all maintenance expense. It is built in four sizes to fit the most common sizes of hydraulic pressure lines—⅜", ½", ¾" and 1". These valves may be specified as replacements on most types of hydraulically operated machinery.

Known as the Nopak Hy-Pressure Hydraulic Valve, this new product is described and illustrated in a small folder issued by its manufacturer.

To obtain the folder or complete information on the Nopak Hy-Pressure Hydraulic Valve, address the Galland-Henning Mfg. Co., Dept. J6, Milwaukee, Wisc.

IF YOU HAVE BEEN USING HIGH SPEED STEEL BLADES...

RECENT government regulations have greatly restricted the supply of 18-4-1 High Speed Steel available for hacksaw blades. To users of this type of blade, we suggest Starrett S-M Molybdenum Special Alloy High Speed Steel Blades as an effective substitute. These tough, fast-cutting blades were developed by Starrett for cutting hard alloys and for metals hard to cut with ordinary blades. In life, performance and all-round cutting ability, they come close to matching 18-4-1 High Speed Steel Blades and because of their lower cost are actually more economical. Convince yourself that Starrett S-M Molybdenum Hacksaws are the blades to use for the duration. Order a trial supply from your mill supply dealer today.

THE L. S. STARRETT CO., Athol, Massachusetts, U. S. A.
World's Greatest Toolmakers

STARRETT
PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

Plomb Bob Utilizes Phonograph Needles

PARTICULARLY adaptable to armament and jig installations, as well as other operations where precision aligning is necessary, is the new Precision Plomb Bob recently announced by Aero Tool Co.

A special feature of the Aero Tool Precision Plomb Bob is the utilization of phonograph needles, assuring a true and constantly sharp point at a practically nil replacement cost. The needle is held by a watchmaker's pin chuck at the indicating end. The hole for the suspension wire is held to exact size and is absolutely centered with the indicating point. The upper part of the Bob is threaded into the lower. Three bearing surfaces between these parts hold them absolutely concentric. Thus, by simply rotating one part upon the other it is possible to raise or lower the indicating point (phonograph needle) over ½" without losing concentricity. This adjustment feature is said to be particularly important in the aligning of gunsights and other armament installations.

According to the manufacturer, the low price of the Plomb Bob removes the high price barrier which has long prevented the widespread use of such precision.

All inquiries regarding the new Precision Plomb Bob should be directed to the Aero Tool Co., 235 W. Olive Ave., Burbank, Cal.

(Turn to Shop Aids Page 115)

PRODUCE FOR VICTORY!
Enlist
WITTEK
Automatic
ROLL FEEDS AND REEL STANDS
Wittek Automatic Roll Feeds and Reel Stands provide improved and simplified methods of punch press operation. They are easily mounted on any make or size punch press and assure fast, safe and accurate feeding under all conditions. Wittek Roll Feeds are made in four different types to meet all automatic feeding requirements.
Write for Descriptive Catalog
WITTEK MANUFACTURING CO.
4305-15 West 24th Place, Chicago, Illinois.

Production Without Waste Motion

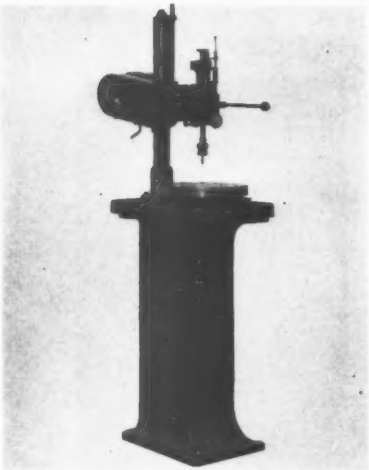
THE M & L Precision Tapper is not a converted drill press but a carefully designed and engineered machine built around the tap to eliminate tap breakage. In line with the increased war production effort, Brand Tool & Supply Co. (formerly Pacific Tool & Supply Co.) have incorporated several improvements in the manufacture of the present M & L Precision Tapper.

While the M & L was formerly made only as a table model, it now comes equipped with a 36" high base with coolant system. The centrifugal pressure pump is directly connected to a 1/30 hp, 50-60 cycle motor. A steady stream can be directed on the work or cut out entirely, all under the control of the operator. A gravity flow returns the liquid to a three gallon capacity reservoir.

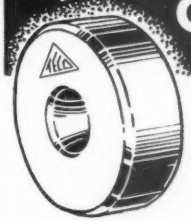
Improvements have also been made on the clutch and pulley so that it is now possible to tap holes up to ½" on chrome moly steels and up to ¾" on softer metals such as aluminum, plastics, brass, etc.

The tap is guided by precision leads so that class three and four specifications are easily met. It also comes equipped with a dial indicator for bottom tapping. The M & L Precision Tapper has a sensitive touch regardless of the type and kind of work being done—pressure of but 25 lbs. is needed to pull a ½-13" tap.

Write to Brand Tool & Supply Co., 344 N. Vermont Ave., Los Angeles, Cal., for Bulletin 142.



Produce More CARTRIDGE CASES with TECO CARBIDE DIES



- DRAW DIES
- NECKING DIES
- SIZING DIES
- TAPERING DIES
- BULLET DIES
- SWAGE DIES

With a "Second Front" in prospect, cartridge case manufacturers must top present production goals by millions and millions of cases. How to do it? Get increased capacity out of every machine in your plant by using TECO Carbide Dies!

Because of their uniform density and hardness, TECO Carbide Dies are breaking production records in America's leading ordnance plants . . . producing greater quantity per die . . . improving quality of finish . . . holding all on-size . . . eliminating rejects. Tell us your needs.

TUNGSTEN ELECTRIC CORPORATION
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Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Pioneers in Tungsten Carbides for Over a Quarter Century

Send for Valuable Booklet

Forgings For All Industries

Rough Turned or Finished Complete

●

Composite Die Sections
Extrusion Tools
Crankshaft Forgings
Gear Forgings
Die Casting Dies

●

Rings, Discs, Blocks, Shafts, Hubs, Bars, and Special Shapes.
Tool Steel of all Makes

S.A.E. Specifications

STAINLESS & COPPER FORGINGS

May We Serve You?

AJAX STEEL AND FORGE Co

205 ADAIR STREET DETROIT, MICHIGAN

for EXTREME ACCURACY in MEASUREMENT . . .

Acme GLASS OPTICAL FLATS !

Measure in Terms of Millionths of an Inch ! A Test for Flatness, or an Accurate Comparator.

★ Acme optical flats and Monochromatic light furnish (in connection with your gage blocks) the lowest cost equipment capable of measurement in terms of millionths of an inch.

Measure in Terms of Microinches by Light Waves

In spite of the extreme accuracy possible with light wave measurement, the procedure is very simple. Place an Acme Glass Optical Flat on your work and gage as shown in the above illustration. The exact size of the work is readily determined from the number of bands that appear.

See illustration at right. The straightness of the bands formed by interference of light waves reflected from the flatlapped steel surface gives a true measure of its flatness.

For the best of all checks of accurately finished flat surfaces . . . to detect wear on your precision blocks . . . equip with Acme Optical Flats and Monochromatic Lamp. They allow rapid inspection of production items and assure peace of mind by furnishing a method to quickly and accurately compare your working set of gage blocks with your laboratory set.

For contract Flat Lapping send description of your requirements. No Obligation!

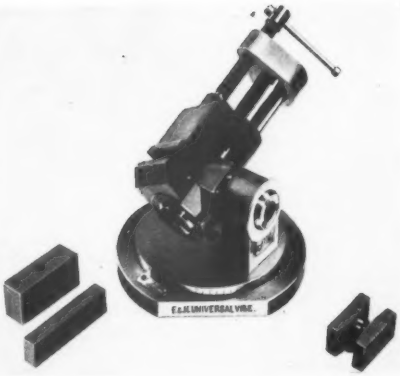
ACME

ACME INDUSTRIAL COMPANY

Makers of Hardened and Ground Precision Parts

206 N. Laflin St. Chicago, Ill. MONroe 4122

Angles Produced With Precision

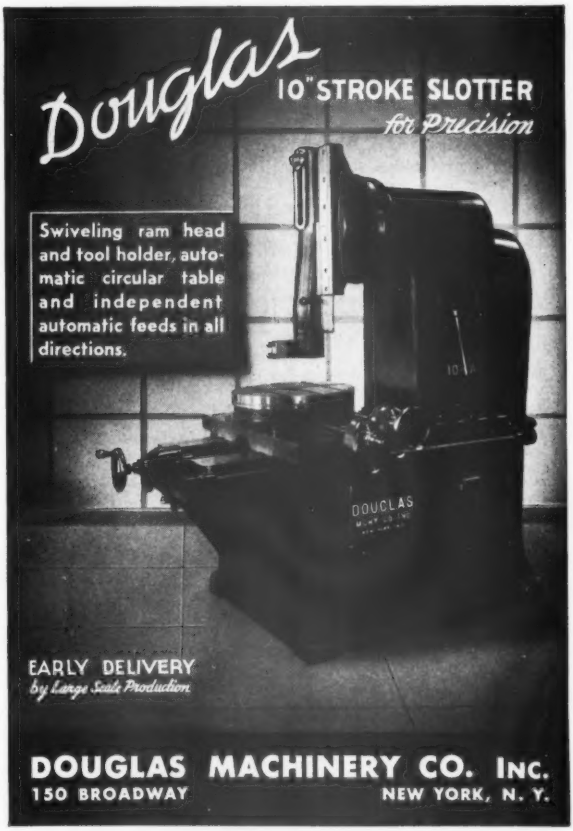


AN "angle machining package", designed to materially reduce setup time in the production of compound angles, is announced by the F & H Manufacturing Co. The package consists of three parts — the F & H Universal Vise, with improved locking control, a grinding wheel angle dressing attachment and a unique swivel clamp for holding odd shaped work pieces. The latter, called "Equihold", consists of two friction plates joined together by ball and socket. It fits between the work piece and one jaw of the vise (being fastened to the latter), adapting itself to the angle of the piece. (See illustration)

The Universal Vise is of all steel construction precision built, with hardened and ground steel jaws. Extreme precision in producing any angle, vertical, horizontal or tranverse, is said to result from the vernier dials which are standard equipment. The vise is compact, being only 4¾" high, yet the jaws open to the standard width of 2¼".

The third item in the angle machining package is a grinding wheel dressing attachment which fits into the Universal Vise, eliminating the need for a separate angle wheel dresser. The dressing tool is rigidly held at the correct "drag" angle for best dressing results.

Complete information can be obtained by writing the F & H Mfg. Co., 6028 Ellery St., Detroit, Mich.



PRECISION GAGE MAKERS

Continuous special training of skilled craftsmen assures the finest precision work to meet the most rigid specifications of leading users of precision gages, gaging fixtures and small stamping dies.
We have designed and built special gages of every type and description for a number of leading production manufacturers. Our facilities for designing and making precision gages and dies are among the best.

May we quote on your gage and gaging fixture requirements?

TOOLS & GAGES, INC.

3112 East 63rd Street **Cleveland, Ohio**

PREVENT BOTTLENECKS AT POINTS OF FINAL ASSEMBLY

FOREDOM'S MODEL 111 *FLEXIBLE SHAFT* GRINDER KIT

Lick those LITTLE JOBS which frequently become BIG BOTTLENECKS. Modern war implements require the use of many millions of small parts and fittings, many of which, because of irregular shapes, cannot be finished by conventional set-ups, or must be touched up during final assembly. That's why this tool is indispensable to every plant. There are few places that can't be reached with the Foredom pencil-size handpiece. It's truly Industry's "First-Aid" Tool.

SPOT MODEL 111 AT CONVENIENT POINTS ABOUT YOUR PLANT

The handiest little "pinch-hitter" that ever came industry's way. Use it at the bench—suspended from any convenient hook—or slung from the shoulder by slipping a strap through motor hanger. Even if you have heavier types of flexible shaft tools, FOREDOM offers the advantage of accurate, sensitive control through its sturdy, pencil-size handpiece, of which thousands are in use. At this low price Model 111 frequently pays for itself on one job. Complete with case and accessories $23.50

Hundreds of Uses

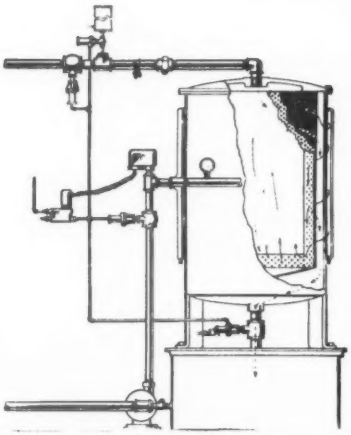
Model 111 Kit literally has hundreds of uses, so versatile is its applicability. Time and again it saves expensive disassembly and reset . . . has dozens of tool room and maintenance uses . . . affords precise control . . . keeps work well in view.

Shoulder slung operation illustrated

Write For Illustrated Catalog No. 354 Today!

FOREDOM ELECTRIC CO.
27 PARK PL., NEW YORK, N. Y.

Automatic Oil Clarifier For Mass Production

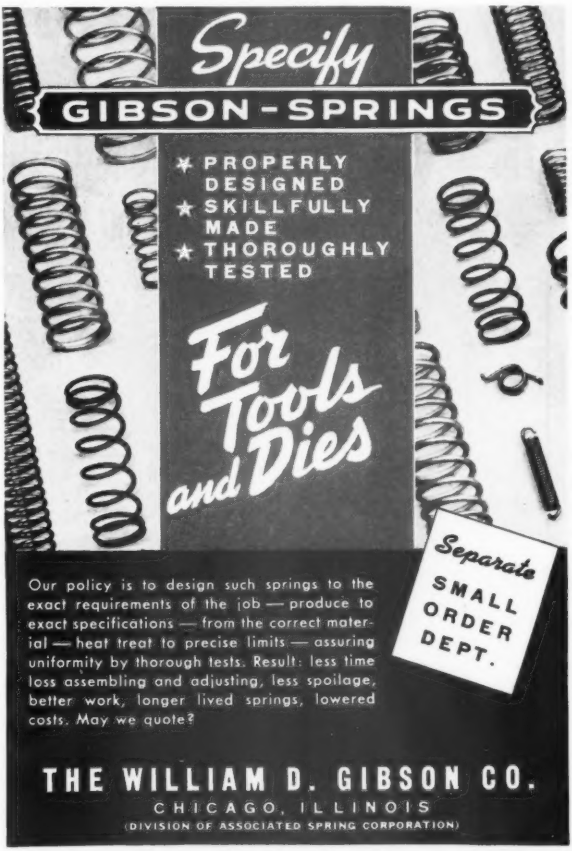


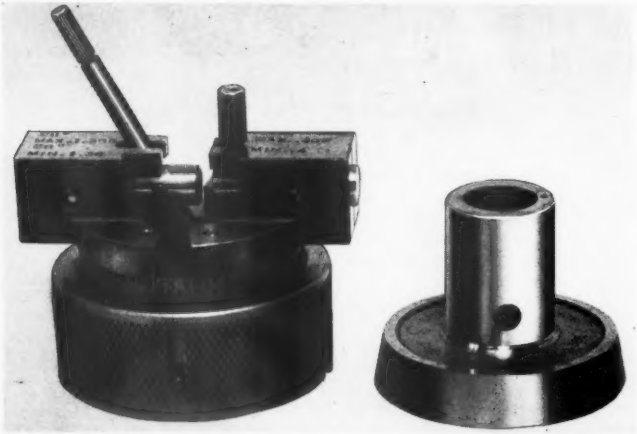
A NEW "High Flow" Automatic Oil Clarifier has been developed to meet the urgent problem of clarifying honing and grinding oils or coolants used in War Production Plants. This unit will remove abrasives from large quantities of oil at the high rate necessary for speedy mass production. The removal of these abrasives as fast as they are liberated in the oil insures continuous operation of machines, allows better finish of the product, prevents grinding wheels or hones from loading and assures faster production.

One of the outstanding features of this Honan-Crane Clarifier is that the cycle of operation is completely automatic and self cleaning. When the pressure drops in the center chamber to 3 lbs., the pressure switch breaks contact and all the valves are returned to their original position and the clarifier is instantly restored to operating condition without any attention from the operator.

Solids contained in the oil are deposited on fine mesh wire cloth as the oil passes through the clarifier enroute to the outlet. It is then returned to the system to be used again and again with practically no loss of oil.

Bulletin No. 26 giving full particulars on the Honan-Crane Automatic Clarifier will be sent on request. Address Honan-Crane Corp., 504 Indianapolis Ave., Lebanon, Ind.


Specify
GIBSON-SPRINGS
★ PROPERLY DESIGNED
★ SKILLFULLY MADE
★ THOROUGHLY TESTED
For Tools and Dies
Separate SMALL ORDER DEPT.
Our policy is to design such springs to the exact requirements of the job — produce to exact specifications — from the correct material — heat treat to precise limits — assuring uniformity by thorough tests. Result: less time loss assembling and adjusting, less spoilage, better work, longer lived springs, lowered costs. May we quote?
THE WILLIAM D. GIBSON CO.
CHICAGO, ILLINOIS
(DIVISION OF ASSOCIATED SPRING CORPORATION)

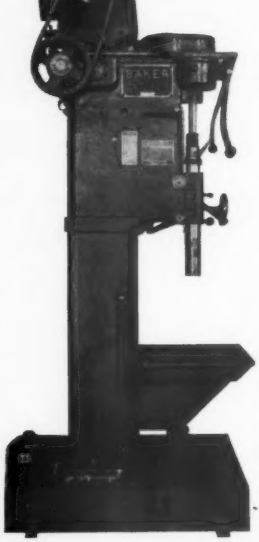


GAGES THAT SAFEGUARD ACCURACY

Our capacity for building fine gages and other tools is fully assured by our force of highly trained, skilled mechanics who *know how* . . . AND the best obtainable precision equipment.

FEDERAL TOOL CORPORATION, 400 N. LEAVITT ST., CHICAGO

BAKER HEAVY DUTY DRILL



new - sturdy - efficient

The Model No. 150 Heavy Duty Drill has ample capacity to drive 1½" diameter high speed twist drills. It is also adapted to boring, counterboring, facing, forming and tapping operations.

To give increased flexibility to the machine the vertical column assembly is of 2-piece design; lower frame which bolts to base arranged to carry standard plan table. The entire upper unit assembly with speed and feed train drives for rotating the spindles and for feeding spindles is mounted on the lower frame. Twelve quick changes of speed are provided.

BAKER BROS., INC.

TOLEDO **OHIO**

Further details are contained in a new attractive bulletin which is now available.

Sound Checking Gears for Greater Economy

WITH noise becoming an increasing cause for gear rejection, checking gears for sound before assembly is becoming a universal practice and is achieving important economies.

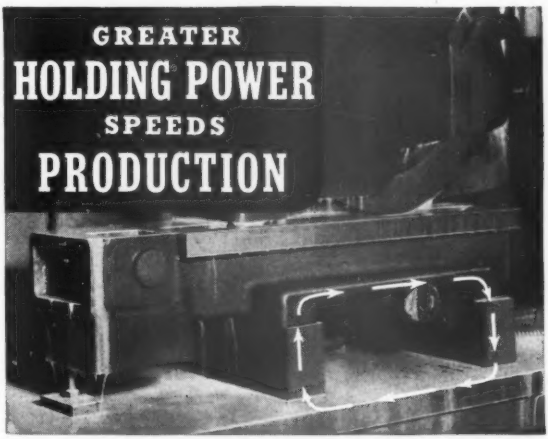
The Red Ring Gear Speeder provides a reliable tool for this operation. It is essentially a device to operate mating gears under load at various speeds and, at the same time, amplify the sound they produce. Gear noise is concentrated at the listening horn to approximately 50 times amplification. The horn directs the whole volume of sound originating in the sound box directly to the inspector's ear. As a result this machine is used anywhere in the shop—no special sound testing room is needed.

The gear spindles are easily adjusted for center distance to accommodate gears of different sizes. This adjustment has a range of $1\frac{5}{8}$" to $5\frac{1}{2}$" in the standard Red Ring Gear Speeder—$3\frac{1}{4}$" to $10\frac{3}{4}$" on the heavy duty.

A brake is provided for applying a load to the gear set in order to clearly distinguish sounds under load.

A specially built multiple speed AC motor provides four speeds forward and four in reverse. This permits testing gears in both directions of travel.

The National Broach and Machine Co., 5600 St. Jean, Detroit, Mich., will furnish further particulars.



Arrows show the powerful "Magnetic Body Flo" which securely locks work, chuck and parallel to the working table.

● **The ANDERSON & BROWN Magnetic Chuck goes beyond the limitations of the conventional chuck which uses "skin" or surface magnetism. It presents a new and extremely desirable method of holding work.**

"Magnetic Body Flo" is the principle involved in holding work with the ANDERSON & BROWN Magnetic Chuck. The magnetic flux flows through the work, the parallel and back to the chuck through the working surface of the grinder, locking all elements tightly together.

The necessity of special holding devices is greatly reduced. Its adaptability, flexibility and intense holding power eliminate in many cases these special fixtures.

Discover how the quick setups and other advanced features of this chuck can save you time and money. Send for copy of "Magnetic Chucking Revolutionized".

ANDERSON & BROWN CO.
2034 East 22nd Street, Cleveland, Ohio

Portable Metal Chiller Used in War Plants

THE development and perfection of the new Deepfreeze Santocel extreme low temperature metal chiller is of importance to the metal working industry.

Among the numerous applications of Santocel Deepfreeze is contraction in compound fitting of metal parts. This facilitates slide fits in assembly operation, relieves strain and possible fractures. Exhaustive tests by competent authorities indicate that sub-zero tempering and stabilization of high speed tool steel will produce a combination of hardening, strength and ductility unobtainable by ordinary hardening or tempering.

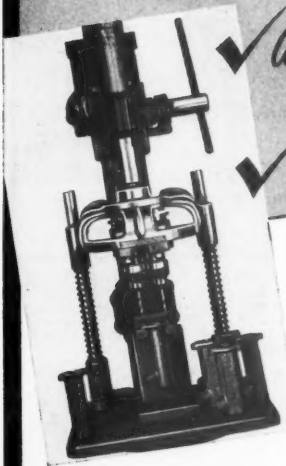
Pictured here is a Deepfreeze installation in a large machine tool plant doing extensive war work. The operator is inserting a machine tool spindle in the unit. This is done so that costly anti-friction precision bearings can be assembled easily and permanently without damage.

In assembling bearings with a drive-fit to shafts, care must be taken not to damage the bearing which is both costly and difficult to replace without effecting a delay in production and delivery of the vital war goods.

The bearing shoulder of the shaft shown is approximately 2" in diameter and can be shrunk .001" to .0015" in 40 minutes at 50° below zero.

Write to Motor Products Corp., Dept. J7, North Chicago, Ill., for more complete data.

LINCO *Two Spindle*
ADJUSTABLE DRILL HEADS
DRILLS TWO HOLES AT ONCE



✓ *Adjustable Centers from ½" to 6"*

✓ *Drill Capacity 0 to 5/8"*

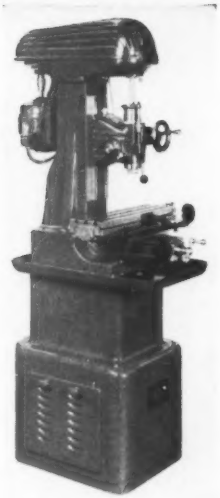
Sleeve and overarm types . . . in several sizes. Will double output of any single spindle drill press.

Quickly adjusted to desired drill centers from ½" to 6".

Send for bulletin.

LINDERME MACHINE & TOOL CO., INC.
12250 COYLE AVE., DETROIT, MICH.

Improved Vertical Mill and Jig Borer Announced



NEW design and construction improvements in the Vernon Vertical Mill and Jig Borer have been announced by Machinery Mfg. Co. of Los Angeles.

It is claimed that in addition to closer overall tolerances in construction, including machining and scraping, improvements in rigidity and operating accuracy have been made in the latest models. The 6" x 21" table has been redesigned for greater rigidity. The column, knee and pedestal have also been redesigned to insure a rigid unit at all times. Micrometer depth stops have been improved to provide even greater accuracy when drilling or boring to predetermined depths. Gib locks and independent quill locks have been improved as well as the longitudinal table stop. A larger chip pan is included on the cast iron base.

To accommodate a greater variety of motors, the motor brackets have been altered to accept individual power requirements. Capacity and accuracy of the Vernon Vertical Mill enable it to perform a wide range of precision tool room and production operations.

All Vernon tools, including the Vertical Mill and Jig Borer, are simply designed, with no complicated controls or involved mechanisms. Highly skilled operators are not required. Thus, men and women new to industry find the Vernon line easy to use, quickly bringing production to peak machine capacity.

Full details, including specifications, are contained in a folder available by writing Machinery Mfg. Co., 1915-J E. 51st St., Vernon, Los Angeles, Calif.

MARTINDALE ROTARY FILES and BURS

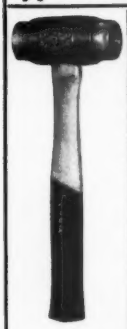
are:

1. Made in 300 sizes.
2. Usually shipped within 6 days after orders are received.

Write for 12-page Bur Bulletin

THE MARTINDALE ELECTRIC CO.
1417 Hird Ave. Cleveland, Ohio

Rawhide HAMMERS *Rawhide* MALLETS



• Genuine Java Water Buffalo Hide replaceable faces in malleable head.

No.	Dia. in ins.	Wgt. in lbs.
0	1	½
1	1¼	1⅛
2	1½	1⅜
3	1¾	2¼
4	2	4
5	2¾	5½

• A finely balanced Tool with tough, resilient Java Water Buffalo Rawhide heads.

Not Loaded				Loaded Mallets			
No.	Dia. Ins.	Lgt. Ins.	Wt. Ozs.	No.	Dia. Ins.	Lgt. Ins.	Wt. Ozs.
0	1	2⅛	2	7	1¼	3	8
1	1¼	3	3½	8	1½	3⅛	12
2	1½	3¼	6	9	1¾	3⅜	16
3	1¾	3¼	7½	10	2	3½	20
4	2	3½	10	11	2¾	4¼	42
5	2¾	4¼	21				
6	2¾	4¾	23				

• These are the tough, resilient, long-lasting Rawhide faces made from specially treated Java Water Buffalo hide for use in Chicago Rawhide Hammers.

CHICAGO *Rawhide* MFG. CO.

1280 ELSTON AVE. ★ CHICAGO, ILLINOIS.

MACHINE FILING and LAPPING OF OTHERWISE INACCESSIBLE JOBS . . .

- Ball Bearings Throughout Machine.
- Fully Enclosed Motor and Drive.
- No Dripping of Oil.

This dual-purpose machine eliminates the necessity for hand-filing on intricate jobs or otherwise inaccessible parts. With fully adjustable stroke from 0 to 1½", and two speeds, this universal machine can take care of all filing and lapping jobs as they come along. Upper table may also be used for compound angles.

Write TODAY for Descriptive Circular.

MARBURG BROTHERS, INC., 88-92 West St., NEW YORK

High Pressure Die Casting Brings Many Improvements

BY using higher injection pressures—up to 22,000 psi—aluminum and brass die castings are now being produced with increased density, strength and improvement of other characteristics.

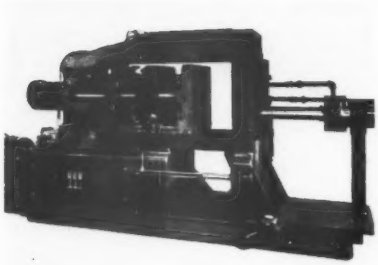
In addition to increased strength and more uniform structure, the high pressure die castings are said to be superior in uniformity of dimension.

Unequalled die closing pressures—400 to 600 tons—are attainable with the rigid beam type cast steel frame, which provides 360% more frame area for holding the dies closed.

Closing is through hydraulically actuated double toggle linkage. This linkage includes hardened cam locks which take the shock of the injection load and prevent it from being transmitted to the link pins.

When a machine is required for short runs, the die closing, the metal injection, the die opening and injection movement are all controlled manually. On long installations, three interlocked interval electrical timers are employed for control and exact repetition.

The Model HHP-3X has capacity to produce, by cold-chamber injection, aluminum or brass castings to 10 lbs. in unit weight and magnesium castings of similar displacements. Advantage in the cold-chamber method lies in the fact that the comparatively low temperature at which the molten metal can be ladled into the injection cylinder results in less cooling strains in the finished work and longer die life.

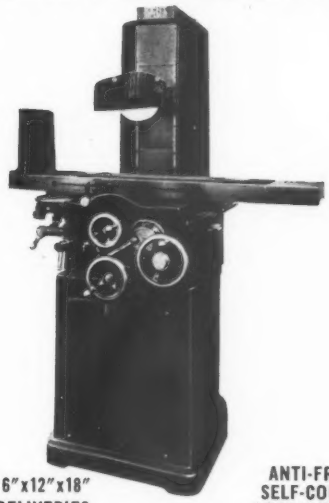


The descriptive bulletin, "Dense Homogeneous Die Castings which Approach Forgings in Strength and Utility," will be sent by Lester-Phoenix, Inc., 2711 Church Ave., Cleveland, O.

ATLANTIC

No. 2 Automatic Precision Type

SURFACE GRINDER



CAPACITY 6"x12"x18"
PROMPT DELIVERIES

ANTI-FRICTION
SELF-CONTAINED
POPE-SKF SPINDLE

ATLANTIC MACHINERY CORP.

149 Broadway New York, N. Y.

Fumbling

WASTES TIME
COSTS MONEY

Boyar-Schultz Machine Bolt Rack saves time in keeping bolts clean and undamaged, and always ready for instant use.

It is sturdily built of heavy angle steel, bolted and spot welded throughout. It holds 104 machine bolts assembled with nuts and washers in lengths up to 16"

Made in 2 sizes for ⅝" and for ¾" bolts. Larger size holds both ⅝" and ¾" bolts.

Convenient because bolts can be quickly measured and selected without removing from rack.

PRICE . . . $18.50

If you are tired of wasting time looking in odd places for the right size machine bolts,

WRITE FOR FREE CIRCULAR

BOYAR-SCHULTZ CORPORATION

2112-G Walnut St. Chicago, Ill.

Price Control Regulation

(Continued from Page 45)

paid, not in excess of the applicable maximum price.

(i) For any part or sub-assembly purchased, the manufacturer shall use the actual price for such part or sub-assembly paid or to be paid, not in excess of the applicable maximum price. For the purposes of this paragraph, the term 'part or sub-assembly' means, in addition to products covered by this Maximum Price Regulation No. 136, as amended, products covered by Revised Price Schedule No. 82—*Wire, Cable, and Cable Accessories*; No. 105—*Gears, Pinions, Sprockets and Speed Reducers*; Maximum Price Regulations No. 119—*Original Equipment Tires and Tubes*; No. 147—*Bolts, Nuts, Screws and Rivets*; and No. 149—*Mechanical Rubber Goods.*

(ii) For any material for which the manufacturer is unable by reasonable diligence to determine the price he would have paid on October 1, 1941, the manufacturer shall use the actual price for such material paid or to be paid, not in excess of the applicable maximum price. In no event shall this subdivision (ii) apply if the material had a published price in effect on October 1, 1941, or if the manufacturer purchased such material on or about October 1, 1941, or if the manufacturer's supplier of the material, or one of the manufacturer's suppliers, was selling such material on or about October 1, 1941.

(4) Where the 'actual price to be paid' for any material (including any part or sub-assembly) or machinery service is required or permitted to be used by the provisions of subparagraph (3) above, or of subparagraph (4) of paragraph (a), in calculating such price:

(i) The manufacturer shall use the price estimated by his supplier, if available: *Provided,* That the manufacturer has no reason to believe that the price so estimated exceeds the applicable maximum price; or

(ii) if a price estimated by a supplier is not available at the time he estimates his price, the manufacturer shall use his own estimate of the price to be paid for the material or machinery services: *Provided,* That if the price so estimated exceeds the actual price charged by the

supplier, such actual price, not to exceed the supplier's maximum price, shall be substituted in the pricing formula and the manufacturer's maximum price recomputed accordingly. If the price so estimated is less than the actual price charged by the supplier, such actual price, not to exceed the supplier's maximum price, may be substituted in the pricing formula and the manufacturer's maximum price recomputed accordingly.

(d) *Reports.* If the price of any machine or part computed in accordance with the provisions of this Section is at any time increased above the price charged on the previous sale or delivery, or is increased above the original contract price by renegotiation or by a price adjustment clause, unless the increase is definitely assignable to a change in specifications or a change in conditions of delivery, the manufacturer thereof shall file the report required by Section 1390.18 (g).

Maximum prices; machinery services.

"(a) (1) *Services with list prices:* If for any machinery service the supplier had a published or confidential machine hour rate or other charge in effect on March 31, 1942, the maximum price to any purchaser for such machinery service shall be the net price which the supplier would have received on that date from a purchaser of the same class.

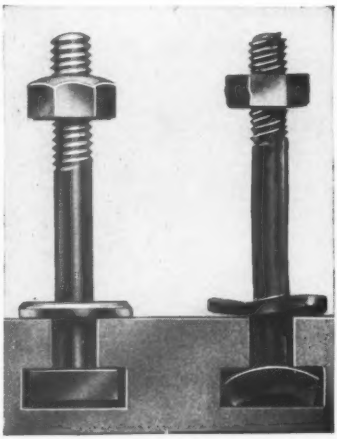
(2) *Reports:* On or before August 1, 1942, every machinery service supplier subject to this Maximum Price Regulation No. 136, as amended, shall file with the Office of Price Administration, Washington, D. C., if he has not already done so, all his published and confidential machine hour rates, charge sheets, and discount sheets in effect on March 31, 1942, for machinery services.

(b) *Services without list prices:* If for any machinery service a supplier had no such published or confidential rate or charge in effect on March 31, 1942, the maximum price for such machinery service to any purchaser shall be determined in accordance with the applicable provisions of Section 1390.7, except that the date March 31, 1942, shall be substituted for the date October 1, 1941, wherever it appears.

(c) *New or converted plants.* Notwithstanding the provisions of paragraphs (a) and (b) of this Section, if

Save THE MACHINE
THE JOB - - TIME

USE BOYAR-SCHULTZ SMB T-SLOT BOLTS



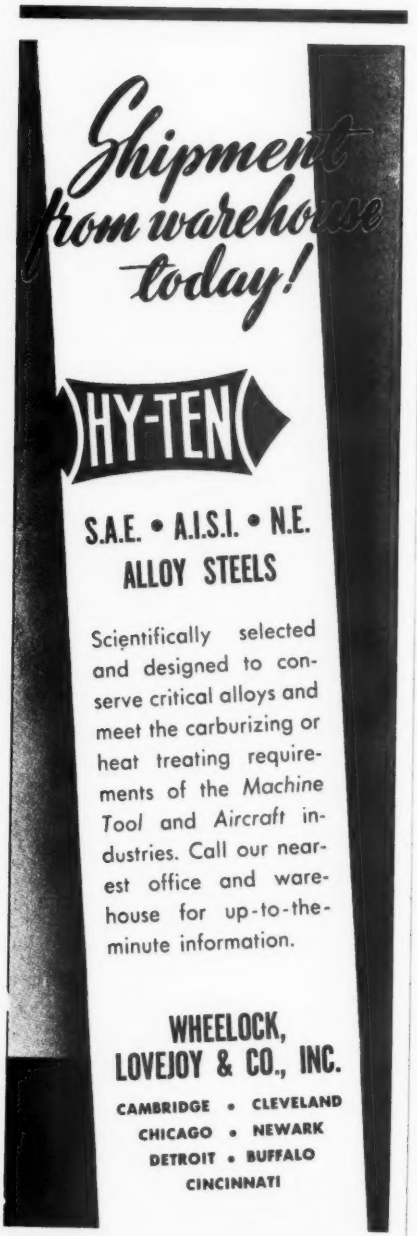
Ordinary bolts, made in the ordinary way cannot be expected to stand up under the hard usage of the modern machine shop. They are easily distorted, threads wear and strip, and the heads may soon become misshapen and destroy the accuracy of costly tools.

Boyar-Schultz SMB Bolts are made of special steel, heat treated for extra toughness. Heads are machined square with bodies making a flat surface for close contact with the upper side of T-slot. Job is held securely and squarely, permitting heavier cuts.

For maximum results use Nuts and Washers made for use with SMB Bolts.

Write for Circular and Prices

BOYAR-SCHULTZ CORPORATION
2112-G Walnut Street Chicago, Ill.


Shipment from warehouse today!
HY-TEN
S.A.E. • A.I.S.I. • N.E.
ALLOY STEELS
Scientifically selected and designed to conserve critical alloys and meet the carburizing or heat treating requirements of the Machine Tool and Aircraft industries. Call our nearest office and warehouse for up-to-the-minute information.
WHEELOCK, LOVEJOY & CO., INC.
CAMBRIDGE • CLEVELAND
CHICAGO • NEWARK
DETROIT • BUFFALO
CINCINNATI

any machinery service is performed in a newly constructed plant or if the supplier is unable to determine the maximum price for any machinery service because it is performed in a converted plant or for any other reason:

(1) *Price:* The maximum price for each sale of such machinery service shall be a price determined so far as possible in accordance with paragraph (b) of this Section and reported pursuant to subparagraph (2) below: *Provided,* That the Office of Price Administration either approves such price in writing or fails to disapprove it within thirty days after receipt of the report. Within five days prior to filing such report and during such thirty-day period, the supplier may quote, contract or perform such machinery service at the proposed price, but final settlement shall be made in accordance with the action of the Office of Price Administration on such report and, if required by the Office of Price Administration, refunds shall be made.

(2) *Report:* Such supplier shall file a report with the Office of Price Administration, Washington, D. C., containing the proposed price, the proposed billing date, a statement of whether or not such machinery service had a published or confidential rate or charge in effect on March 31, 1942, all relevant price-determining data including evidence that the proposed price was determined so far as possible in accordance with paragraph (b) of this Section, and a brief description of the newly constructed or converted plant. If the supplier desires such price to become the maximum price applicable to such machinery services thereafter performed, a statement that the report is also being filed pursuant to Section 1930.13 should be made."

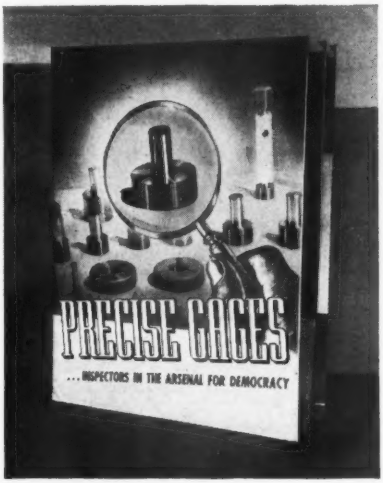
Regulation 136, as amended, allows additions to maximum prices of certain "emergency service charges", both in the case of list-price items and special items. If a manufacturer has to secure steel from a warehouse to produce a vital part on rush order under emergency conditions, the additional cost may be passed on, provided it is billed separately.

Excluded from the regulation's provisions are secret United States Govern-

(Continued on Page 108)

"Inspectors in the Arsenal for Democracy"

A SPECIAL brochure published by the Precise Tool & Manufacturing Co. of Farmington, Michigan, gives the metal working industry a brief but concise story of the company. Photographic reproductions show the wide variety of tools and gages manufactured at Precise without attempting to catalogue them.

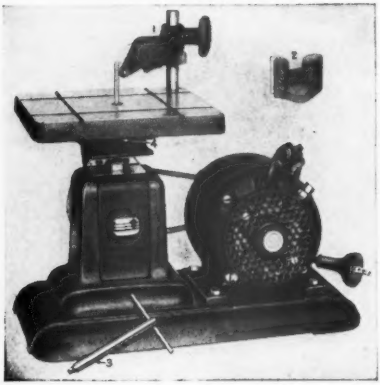


Short to the point copy tells of the carefully controlled conditions under which this all important precision equipment is manufactured in the Farmington plant.

The illustration of the brochure is shown above. Copies can be obtained by writing the Precise Tool & Mfg. Co., Dept. J. 7, Farmington, Mich.

SPEED UP WITH
CULLMAN
MOTOR DRIVES
Get maximum production from lathes, screw machines, punch presses, shapers and other equipment now belt driven from shafts, by modernizing with CULLMAN Motor Drives.
You can increase machine output 25% through greater flexibility, instant control, and belt drive smoothness. You can install a CULLMAN Motor Drive in a few hours. On most machines only four bolts are necessary. CULLMAN Motor Drives are made for motors ranging from ¼ to 15 H.P.
Don't delay. Start taking that extra production now. Prompt deliveries can be made.
CULLMAN WHEEL CO.
1332 Altgeld Street, Chicago, Ill.

FOR QUICKER SETTING STREAMLINED PERFORMANCE



EVERY tool and die man knows that one of the most troublesome and inaccurate tools that he must work with is the filing machine. This is due to crooked file shanks which bend off at a different angle from the file itself during the hardening process. As a result, in a great many cases it is almost impossible to impart an absolutely true vertical motion to the file.

All of these troubles have been solved by the Industrial All American Filing Machine. This machine, with its Universal Joint File Clamp, makes it possible, in a few moments, to set the file absolutely square with the table and enables you to do work of utmost accuracy.

For further information write:

Industrial Engineering Co., Inc.

141 W. Jackson Blvd. Chicago, Ill.

New Alloys Conserve Vital Metals

TWO new lead-base bearing metals, known as Pyramid and Defender, have been developed by the Magnolia Metal Co. as substitutes for tin-base babbitts which are now so difficult to secure.

Pyramid Metal is well suited to applications where bearings must withstand heavy sustained pressures found in ma-

rine reciprocating engines, water turbines, paper mill calender stacks and rolling mill machinery.

Defender Metal stands shocks without cracking and is well suited for use in internal combustion engines, trap rock crushers and sifter machinery.

For steady high speeds and uniform loads usually found in line shafting, electric motors of 10 to 250 hp, pumps and general machinery, the makers recommend Magnolia Anti-Friction Metal.

Further details on all Magnolia bearing metals will be sent on request. Write to Magnolia Metal Co., 126 Bayway, Elizabeth, N. J.

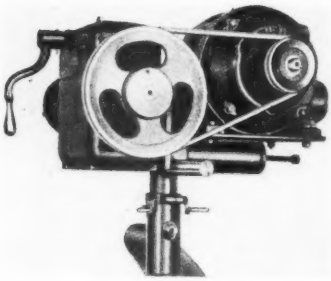
Price Control Regulation

(Continued from Page 106)

ment contracts in which the nature of the commodity produced is not disclosed —for military reasons. Also excluded are developmental contracts and subcontracts in which experimental and developmental work might be seriously jeopardized by the application of price controls. Emergency purchases by the Government for immediate delivery are also exempt from price control, as are cost-plus-a-fixed-fee contracts pending further study by the Office of Price Administration.

Berkeley

MOTOR DRIVES



BERKELEY Motor Drives are designed and custom-built for every type and size machine tool.

Elimination of overhead belting increases efficiency of the machine and operator as well as providing flexibility in machine placement.

The demand for greater production necessitates the utmost from machine operation. Berkeley Drive Units give maximum machine production.

A new catalog T7 gives the engineer complete construction and installation data. Write for copy today.

THE BERKELEY EQUIPMENT COMPANY

Corry, Pa.

TAPS GUIDED BY PRECISION LEADS

M & L No. 1 PRECISION TAPPER

Taps class 3 and class 4 gauge fits to Army and Navy specifications ON A PRODUCTION BASIS. Leads furnished for right or left hand threads, 13 threads to 120 threads per inch. Capacity ½" including ⅛" pipe threads — four speeds 95 to 395 RPM. Has dial indicator for bottom tapping. Ball bearings throughout. Equipped with coolant pump system. No skilled operators necessary — sensitive touch — minimizes "rejects". Prompt delivery.

★ ★ ★

Compact, simple and durable BRAND *Telescope Gauges* quickly determine inside measurements that are otherwise hard to obtain—a small, new handy *knurling tool* that handles diameters as small as $\frac{5}{32}$"—and a positive offset boring head that takes the guesswork out of your readings and assures accuracy—are a few of the many tools available from the Brand Tool and Supply Company. Write for complete information—NOW!

Immediate Delivery—Satisfaction guaranteed

BRAND TOOL & SUPPLY CO.

formerly Pacific Tool & Supply Co.

344 N. Vermont Ave. Los Angeles, Cal.

PUBLICATION PREVIEWS

Sales and Technical Literature

DOUGLAS PLAIN MILLING MACHINE—This machine, designed to meet the demand for a small sturdy machine for accurate work, is well described and illustrated in new Booklet MM-7. The specifications are arranged in tabular form for quick reference. Douglas Machinery Co., 150 Broadway, New York, N. Y., will send a copy.

RADIUS DRESSER FOR SURFACE GRINDERS—The latest illustrated folder on the new C-66 Radius Dresser for surface grinders is now available. As this folder explains, "Mechanics need no longer be discouraged about dressing radius wheels. It is no longer considered a problem." The explanation follows and can be obtained by writing Schultz & Anderson Co., 111 Edison Place, Newark, N. J.

REVERSIBLE TAPPING ATTACHMENTS AND DRILL HEADS—Leaflet D-7 lists features and sizes of Dorman Attachments and Drill Heads. Interesting photographs show spindle drill heads and tapping attachments in operation. Dorman Machine Tool Works, 357 Canal St., New York, N. Y., will send further information and literature at your request.

MACHINE TOOL MOTORIZING—Particularly timely is the issuance of a new, fully illustrated catalog by Drive-All Mfg. Co., Detroit manufacturer of machine tool transmissions for individual motorizing. An outstanding feature of the catalog is the full treatment of a simplified technique of mounting individual motorizing units with standardized brackets on any type of machine tool.

This new publication points out the definite advantages of individual motorizing of belt driven machines from standpoints of economy, production increase, shop flexibility and appearance and improved working conditions. Such information should prove doubly helpful today when businesses, large and small, are being urged to equip themselves to take care of work essential to the war program. It is known that there are many hundreds of older machine tools in the country that only need such modernizing as this to step them up to the pace of modern production. It's a practical, informative catalog with the kind of application pictures and engineering data that shop men find useful. The publication is available directly from Drive-All Mfg. Co., 3400 Conner Ave., Detroit, Mich.

METALMASTER LATHES—A new and attractive spiral-bound booklet has been issued by The Bradford Machine Tool Co., Dept. M-7, Cincinnati, O., to introduce their Metalmaster Lathes. The format of this booklet is excellent and the booklet is one that should be in every tool room and die shopman's working library. The machines are attractively illustrated, with many shop application photographs and line drawings. Principal dimensions and capacities are set forth in a quick-reference style. Send for your copy.

PRECISION EQUIPMENT FOR TOOL AND MACHINE INDUSTRIES—This new catalog illustrates, describes and lists specifications on the Challenge line of lapping plates, layout surface plates, bench plates, work benches, straight edges, parallel blocks, angle plates, V-blocks and cut-off machines. Copies of the catalog are available on request to The Challenge Machinery Co., Grand Haven, Mich.

RIGHT AND WRONG OF HOB SHARPENING—is the latest booklet in the Illinois Technical Data Series. The subject of hob sharpening is completely and thoroughly covered. Drawings clarify all points discussed. It is an excellent technical treatment of the subject in every respect. Copies will be sent free of charge by writing the Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.

CHALLENGE DUPLEX BENCH BLOCKS

Made in three combinations . . . (1) one surface smooth and the other grooved for lapping ½-inch mesh (2) both sides smooth (3) both sides grooved. Semi-steel — precision ground, both top and bottom. Also furnished with either or both surfaces hand-scraped at extra cost. Provide double utility and can be used as a base for small fixtures and tools. One size, 10x14x2⅜-inches.

CHALLENGE SURFACE PLATES

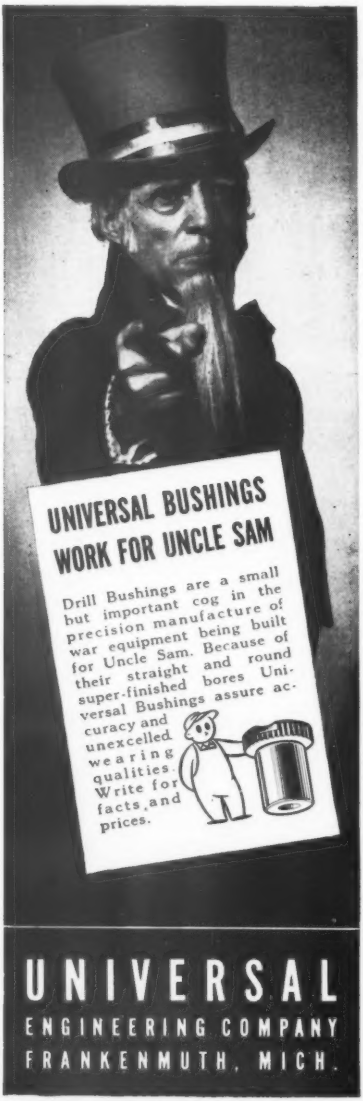
A true surface for tool making, testing, and inspection. Built to retain accurate plane surface. Will not sag. Made of close-grained semi-steel—*hand-scraped.* Also furnished with precision ground surface. Felt lined wooden protective cover supplied with each plate. Write us today for full details. 421

LATEST CATALOG illustrates and describes the complete line of Challenge Precision Equipment. Send for it at once!

THE CHALLENGE MACHINERY CO.
GRAND HAVEN, MICHIGAN

Plant Efficiency Booklet Released

A BOOKLET on plant efficiency has been published by the Division of Information, WPB, and is now available for distribution on request.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Drill Bushings are a small but important cog in the precision manufacture of war equipment being built for Uncle Sam. Because of their straight and round super-finished bores Universal Bushings assure accuracy and unexcelled wearing qualities. Write for facts and prices.
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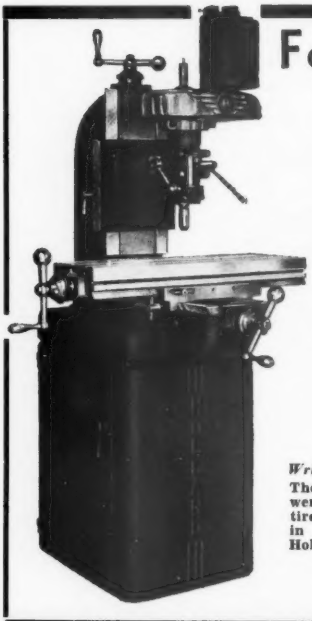

For AIRCRAFT PARTS PRODUCTION

HOLLAND 8" x 16" VERTICAL MILLING MACHINE

This rugged miller is widely used in aircraft and armament plants, as well as toolrooms. The high-speed head, a self-contained motor-driven unit, can be turned to angle parallel with the longitudinal feed. Of compact design, with extra large handles and convenient controls, the Holland Miller is ideal for small parts like the aluminum link shown below. Chrome-plated quill has lever feed. Large feed dials for easy reading. Spindle mounted precision pre-loaded ball bearings.

SPECIFICATIONS: Table Size, 8" x 26"; Table Range, 8" x 16"; Vertical Feeds, 3" on Quill, 8" on Quill Head; Collet Capacity, ½". Swivel Head graduated to 90° left and right. Dial Graduations in .001".

Write TODAY for illustrated bulletin.

The holes on this aluminum link were spotted, bored and the entire radius and shank milled in one setting on the Holland.

MARBURG BROTHERS, INC., 88-92 West St., NEW YORK

SAVE TIME AND LABOR with this new DIE TRUCK

One man alone can handle the heavy job of moving dies from storage racks to press with this new die truck. Adjustable table lifts from 24" above floor to 40" above. Features faster table travel; adjustable sliding spools on keyed shaft; and adjustable cast steel punch holder clamps. Truck is easier rolling. Table provides more working room and also can be used as a practical work bench.

★ 10-Day Delivery If Priority Is Furnished. Write or Telephone.

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Knurling of Socket Screws originated with "Unbrako" years ago.

The Knurled Head

SAVES TIME

UNBRAKO

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KNURLED SOCKET HEAD CAP SCREWS

The knurls keep the mechanic's fingers from slipping in spite of oil and grease and therefore help him to save time before applying a wrench. They also make it possible to use pliers to make adjustments where the use of a wrench may not be convenient. Pliers on smooth heads slip too easily.

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It will pay you to investigate the line of Oliver Die Making Machines!

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We also build Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Template Tool Bit Grinders.

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IMMEDIATE DELIVERY
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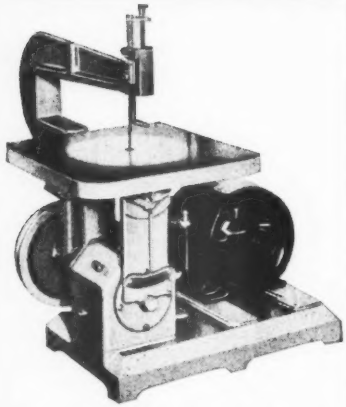

Can be used for all kinds of die making. The overarm is constructed so that the file and saw attachments may be interchanged with little effort. The holddown fingers are attached directly to the overarm. Working surface of the table, which tilts two directions, is entirely clear. An improved type of chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast.

The ATLAS Die-Filing Machine has every possible advantage for rapid and accurate diemaking — AT A BIG SAVING OF LABOR.

Price, complete with motor — **$125.00** Net
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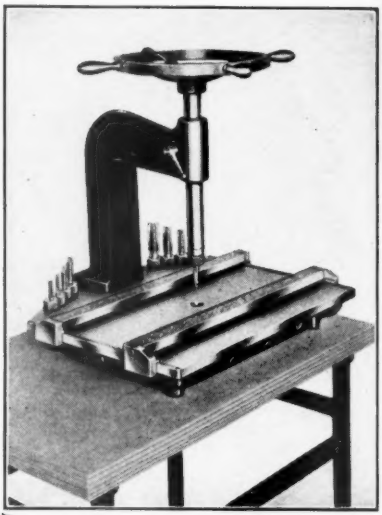

Tools are Weapons!

● And the Viking Tapper, a precision built tool, will also help make weapons. It eliminates tap breakage, thus enabling the use of high speed ground threads and cuts hand tapping time.

The base is semi-steel casting, well ribbed and seasoned to prevent warping. Two sliding parallel bars hold work in place while tapping. Quick changing adaptors, requiring but 5 seconds to change tap, are provided. The steel spindle is hardened, ground and lapped to a perfect gage fit. A spindle lock holds the spindle in position. *Send for illustrated circular*

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SHOP AIDS

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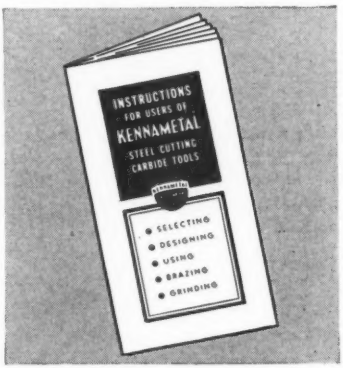


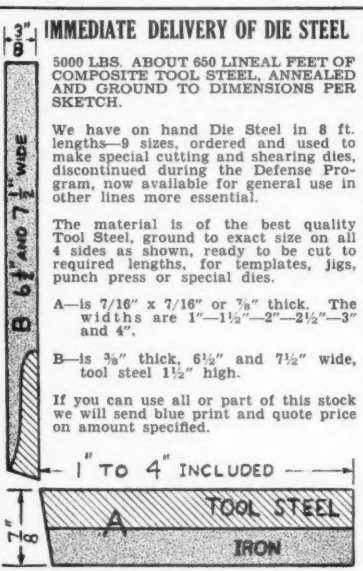
instructions show readers exactly how to get the utmost in service from all types of Kennamteal steel-cutting carbide tools. The manual is further clarified by more than 100 illustrations. Copies will be forwarded on request.

MAGNETIC TOOLS AND APPLIANCES—This book deals with the applications of magnetism in engineering production. The contents cover the following—magnetic chucks, magnetic detection of flows, magnetic clutches and lifting magnets, magnetic separators, magnetic brakes and solenoids and magnets and magnetizing.

The author is E. Molloy, who was assisted by a staff of technical experts. There are 101 illustrations to help make this book of value to production engineers and work managers. Write The TOOL & DIE Journal, 2460 Fairmount Blvd., Cleveland, O. Price $2.50.

PLANE TRIGONOMETRY MADE PLAIN—contains 389 pages, 198 illustrations, is thoroughly indexed and durably bound in blue cloth. The author of this practical volume, Albert B. Carson, Ph.D., Instructor of Mathematics, Louisiana State University, treats in detail the fundamentals of plane trigonometry. Much attention is devoted to numerical work and emphasis is placed on the application of trigonometry principles in the solution of everyday problems. The contents are: historical account, principles of triangles; trigonometric ratios; logarithms; practical applications; oblique triangles; reduction formulas; relations between trigonometric functions; functions of two angles; graphical representation; inverse trigonometric functions and equations; logarithms of numbers; natural trigonometric functions; use of logarithms in solving triangles; and logarithms of trigonometrical functions. Price $2.75.

HOW TO READ ELECTRICAL BLUEPRINTS—In making drawings from which blueprints are to be made, it has become general practice in the electrical industry to use symbols to represent certain objects, instead of drawing the picture. To avoid confusion, this text has been written in sections. Eight sections are devoted to the various branches of industry: for example, one section explains how to read blueprints for wiring buildings; another, diagrams of motors and generators, etc. The authors are Gilbert M. Heine, Cutler-Hammer, Inc., and Carl H. Dunlap, American School. The book is well illustrated with over 300 photographs and drawings. Questions and answers in each section are a source of additional information rather than for review. Requests for this book should be sent to The TOOL & DIE Journal, 2460 Fairmount Blvd., Cleveland, O. Price $3.00.



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5000 LBS. ABOUT 650 LINEAL FEET OF COMPOSITE TOOL STEEL, ANNEALED AND GROUND TO DIMENSIONS PER SKETCH.

We have on hand Die Steel in 8 ft. lengths—9 sizes, ordered and used to make special cutting and shearing dies, discontinued during the Defense Program, now available for general use in other lines more essential.

The material is of the best quality Tool Steel, ground to exact size on all 4 sides as shown, ready to be cut to required lengths, for templates, jigs, punch press or special dies.

A—is 7/16" x 7/16" or ⅞" thick. The widths are 1"—1½"—2"—2½"—3" and 4".

B—is ⅜" thick, 6½" and 7½" wide, tool steel 1½" high.

If you can use all or part of this stock we will send blue print and quote price on amount specified.

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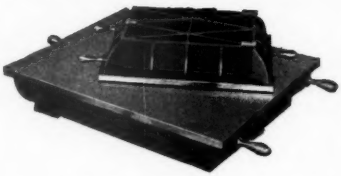
EAST ST. LOUIS, ILLS.

MILWAUKEE SURFACE PLATES



A full line of surface plates, angles and box parallels. Standard plate sizes from 8" x 12" to 48" x 96", larger sizes with or without legs. Plates are finish-planed and scraped to insure a very accurate surface.

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Remove
BROKEN TAPS

Quickly
Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.

Easily
Tap Extractor and Tap Wrench are only tools needed.

Safely
Threads are not damaged. Not necessary to tap oversize after broken tap is removed.

Write for Folder 151

THE WALTON COMPANY
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MAJESTIC INTERNAL GRINDING MACHINE

The Majestic Internal Grinder meets the exacting requirements for internal grinding operations in the tool room and die shop. It offers reliable, balanced operation, maximum output and valuable help for all-out production.

Sturdy and durable, the Majestic Internal Grinder is equipped with Parker spindle and motor. Parker ball bearings and standard rotor and stator assure perfect balance for smooth spindle movement.

An adjustable work head has a graduated base which swivels 90 degrees on each side of the center for taper grinding.

Send for valuable circular.

MAJESTIC TOOL AND MANUFACTURING CO.

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by

Gordon B. Thayer

Well organized and easy to follow, the book contains an extensive Nomenclature, suggestions on design procedure, Four-Place Shrinkage Charts and drawings representative of the latest design of molds and molding fixtures.

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TOUGH, NON-INFLAMMABLE, PERMANENT PLASTIC MATERIALS

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A 60,000 R.P.M. Unit

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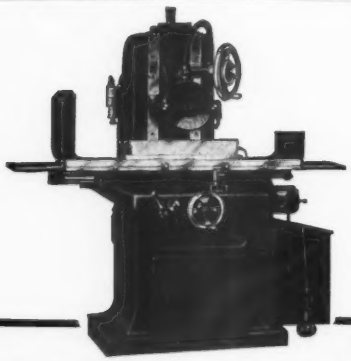

Grand Rapids Surface Grinders are the result of over thirty years actual experience in the building of precision grinding equipment . . . A patented vertical head adjustment is featured. When using the circular Vernier reading for extreme accuracy, the graduated circular plate can be set at zero in relation to the pointer extending inward from the rim of the large hand wheel. The pointer will travel in the same direction as the small inner hand wheel, but at ⅛th the speed . . . Attractive and amply illustrated Bulletin GL-100 is available.

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304 Straight Ave., SW Grand Rapids, Mich.

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A Tool Room Necessity

Every tool room needs this simple, portable, sturdy demagnetizer. Small parts passed through the powerful AMC field are instantly demagnetized. Large, flat surfaces can be demagnetized by sliding the device over the surface.

Price is only $32.50, complete as shown.

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ALOFS MFG. CO.

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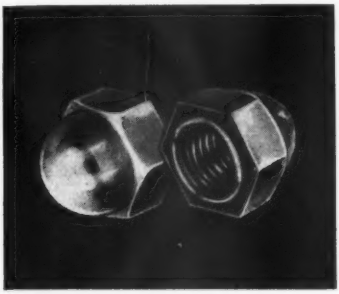
Self-Contained Lock Nut Speeds Handling

CAP (acorn) shapes are now available in An-cor-lox nuts, according to the manufacturer.



The cap nuts will be made to users' specifications. A wide choice in materials for the nut body is offered; also considerable variation in the metallic composition of the locking ring insert. All standard sizes—measured by bolt diameter dimensions—are obtainable with thick or thin walls.

The cap nuts are of all metal construction and self-contained. The locking ring is made integral with the nut body, comprising a single unit lock nut notable for its quick, easy handling.

Further details will be supplied by the An-cor-lox Div., Laminated Shim Co., Inc., Glenbrook, Conn.

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Aircraft Steels ★ Alloy Steels ★ Ball Bearing Steel ★ Boiler Tubes ★ Chisel Steel ★ Cold Finished Steels ★ Cumberland Ground Shafts ★ Drill Rod ★ High Speed Tool Bits ★ S.A.E. Steels ★ Shim Steel ★ Strip Steels ★ Spring Steels ★ Tool Steels ★ Tool Steel Tubing

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Berger SENSITIVE HAND TAPPER

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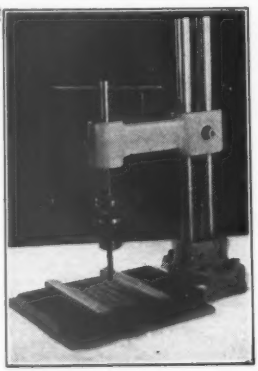

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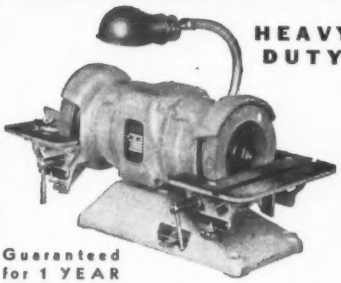

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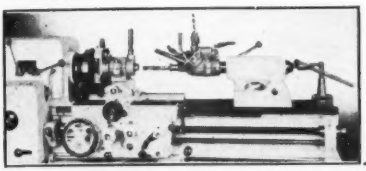

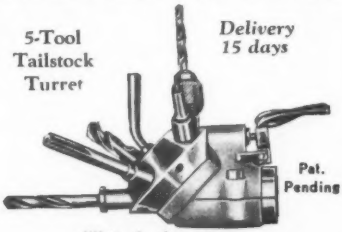

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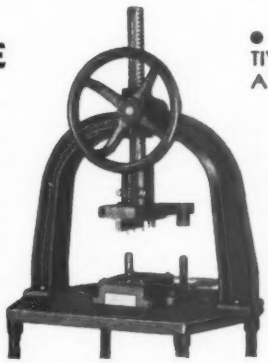

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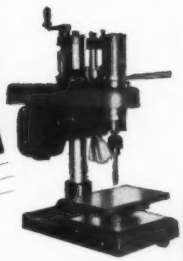

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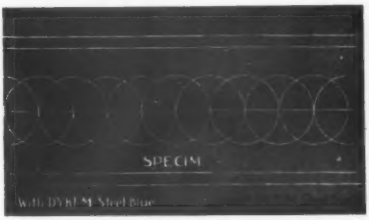

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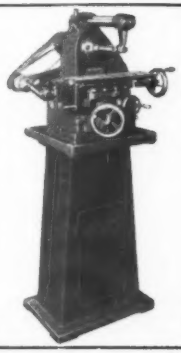

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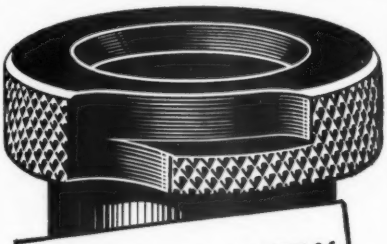

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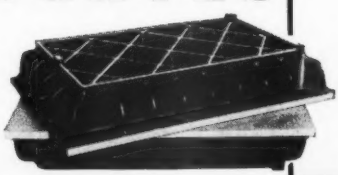

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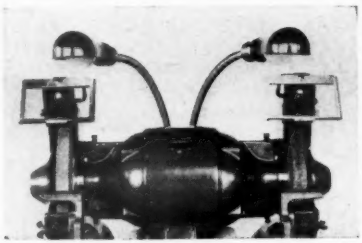

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GAUGES — TOOLS — FIXTURES
JIGS — SPECIAL MACHINES
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Die & Tool Makers
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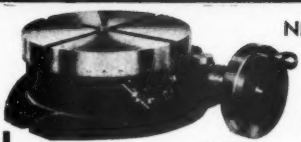

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12"	160.00
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FAST DELIVERY GUARANTEED

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WE CAN ALSO FURNISH DIVIDING ATTACHMENTS

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12″ to 24″ Wheels; 2 to 10 H.P. Motors

Prompt Shipments

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— the only Tool Makers' Indicator on the market with Two Working Ends for inside and outside tests. Compression and balance torsion give accuracy to a tool of high magnifying power. Scale of indicator reads .001″ and has 11 lines divided into ⅛″ space. Shock proof. Attachments of the indicator broaden its use and fit any gauge on the market with ⅜″ spindle. Dealers Wanted.

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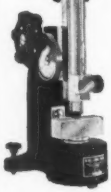

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is simple and sturdy—the powerful clamp binds the turret solidly to the base, relieving the index plate and plunger of all strain. Jig boring (with a face plate), drilling, milling, slotting and other operations can be done. It is equally practical for special work or for production.

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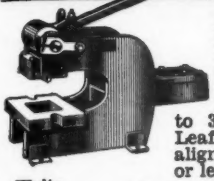

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Geared for Victory!
BEVEL — SPUR
WORM — HELICAL
The TAYLOR MACHINE Co.
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"TAYLOR - MADE"

(Continued from Page 72)

A scientifically designed gage department is incorporated in the Savage plant. These rooms are hermetically sealed against dust and outside atmospheric conditions. An air-lock entrance, double-thick glazing and air conditioning system provide a temperature constant to within one degree of 68° F, at which temperature the basic accuracy of all gage blocks is set.

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Speeds layout on all metals. Gives clean accurate detail. Won't chip, crack or flake off. Comes 8 oz. brush-in cans, also pts., qts., gals., drums.
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QUICK
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Designers and Manufacturers of
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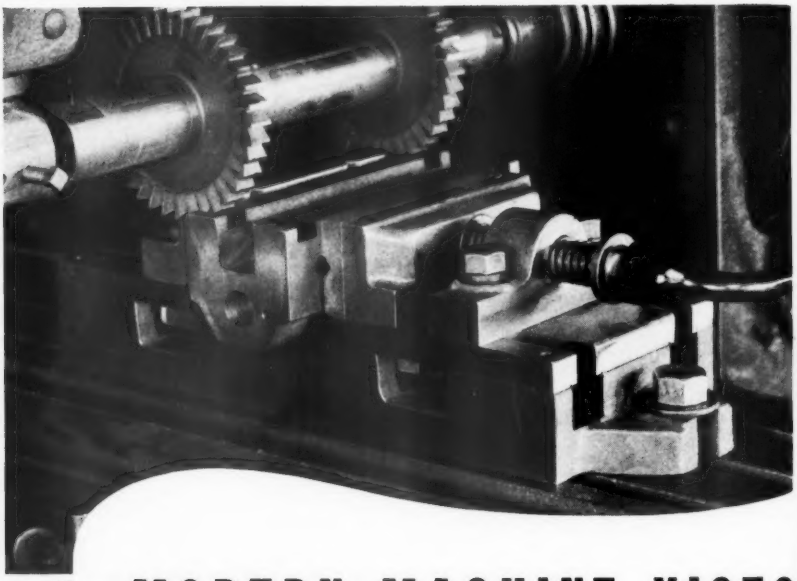

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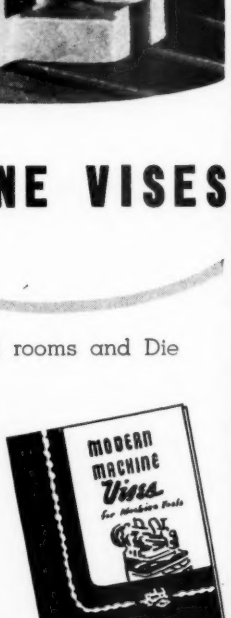

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COMPACT COOLANT PUMPS

eep tool and work tem-eratures right for fast, fficient, trouble-free pro-uction.

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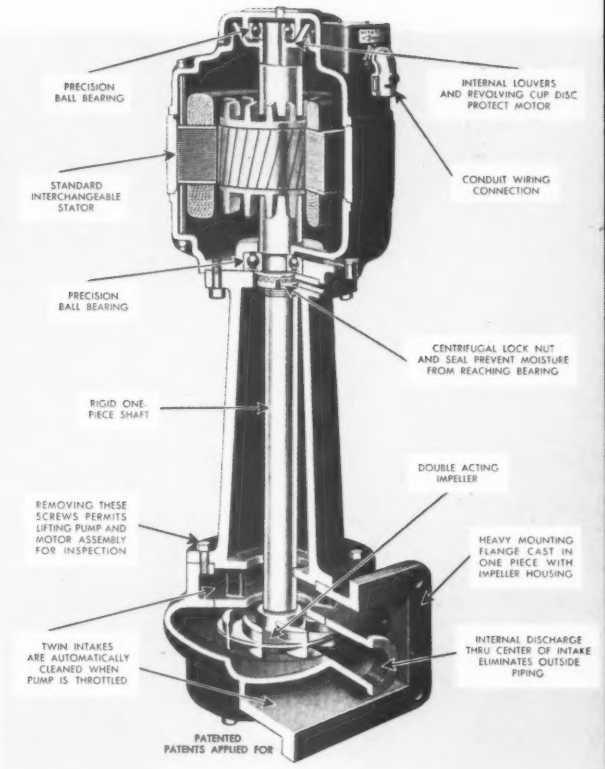
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Cuts Two 6″ dia. Gear Blanks every 11 minutes

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